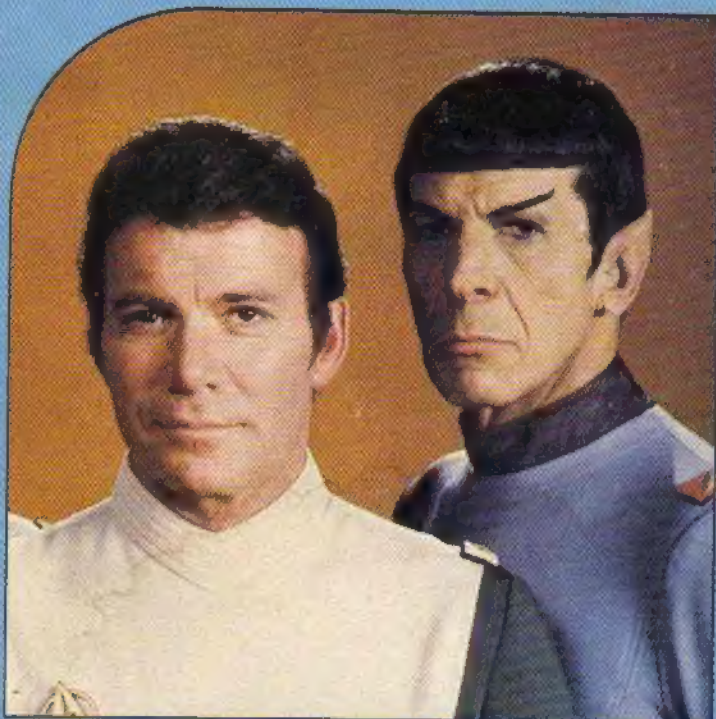


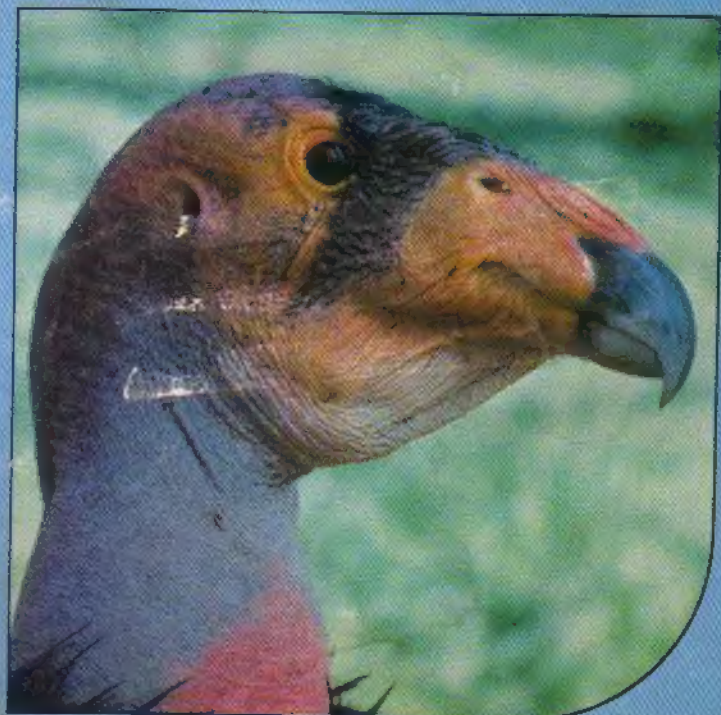
321 CONTACT TM

Dec. 1979/Jan. 1980 95¢ 14192

Star Trek Movie! A Behind-The-Scenes Preview



**Inside:
Hits of the 70s
Meet Topatopa
Predict
the Future
Much
More!**





When 1979 is over, it will also be the end of the 10 years called the **seventies**. The end of a decade is a time when people stop and look back at the last 10 years.

Things have changed a lot. Ten years ago, few people had heard of gas lines, space shuttles or John Travolta. If you had said the words "energy crisis," no one would have known what you were talking about.

The end of the decade is also a time when people make predictions about the future. Often they are surprised by the way things turn out.

Take the year 1900, for example. One expert said the cities were in serious trouble. Their population was growing. People needed horse and buggies to get around. In a few years, the cities would be overrun with horses! That expert failed to count on a new invention—the car.

You can take a last look at the 1970s and a peek into the future. You don't even have to leave your seat. Turn to page 13, where our special salute to the seventies begins.

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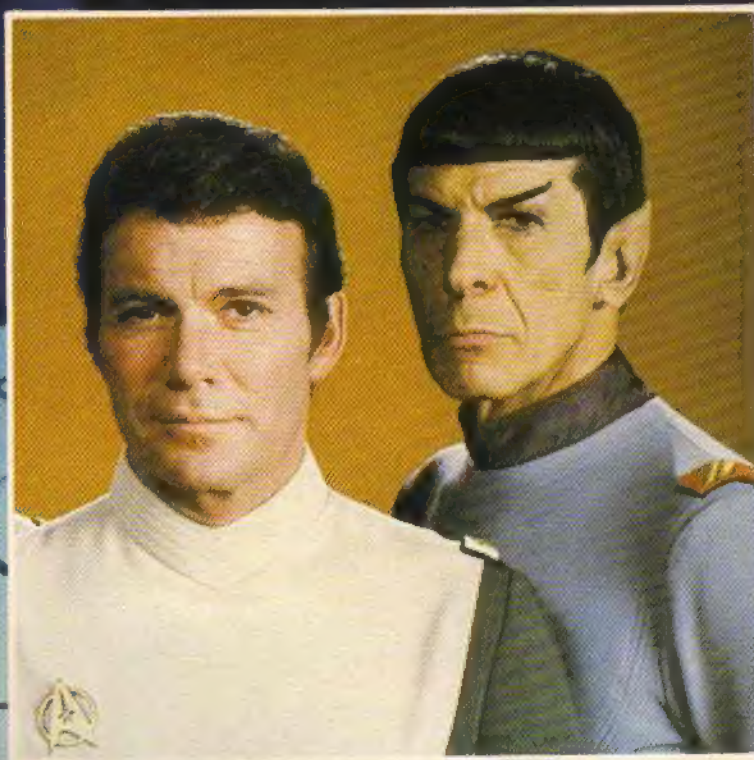
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STAR TREK

**A TV FAVORITE
BECOMES A
SPECTACULAR
MOVIE**

By Ken Wilson



The time is 300 years in the future. A mysterious blue cloud has appeared in outer space. It has destroyed three Klingon spaceships. In another 24 hours, it will destroy the Earth. It's up to the crew of the *Starship Enterprise* to stop it. Will Kirk, Spock and the others succeed? Will the world survive?

The villain of the new *Star Trek* is a mysterious blue cloud. In this scene from the movie, *Enterprise* officers investigate the inside of the cloud.

You'll have to wait until next month to find out. That's when *Star Trek: The Motion Picture* arrives. (turn the page)

There are old and new members in the movie crew. Top: Newcomers Captain Decker and the bald alien beauty Ilia. Middle: Spock, pointy-eared Vulcan, returns after 15 years. Bottom right: Old-timers Scotty and Kirk run the ship together.

For most people, this won't be their first look at the *Starship Enterprise*. From 1966 to 1969, the *Enterprise* cruised the skies on television. A small group of fans followed the adventures of Captain Kirk, Mr. Spock and Dr. McCoy. But not enough people watched, and *Star Trek* was cancelled. No new shows were made. *Star Trek* was forgotten—but not for long.

A month after the final show was on TV, the first Americans landed on the moon. Suddenly, people everywhere were talking about space travel. And so, the old *Star Trek* shows were put on TV again, the way many old TV shows are.

No one could have predicted what happened next. People who had never seen the show discovered *Star Trek*. Loyal followers watched the show over and over. Fans began calling themselves "trekkies." They started fan clubs in 47 countries around the world. *Star Trek* was a hit!

"I guess *Star Trek* came along too soon," says Gene Roddenberry, who created the show. "If we had waited just a few more years, we might still be showing new shows on TV today."

Gene is also the man who is making *Star Trek: The Motion Picture*. Joining him are all the actors from the old TV show. William Shatner plays Admiral Kirk. (On TV he was just a captain.) Leonard Nimoy is the pointy-eared Mr. Spock. And De Forest Kelley returns as Dr. McCoy.

But not everything about *Star Trek* has stayed the same. "Science has advanced a great deal in





the last 10 years," says Roddenberry. "And people who go to the movies know a lot more about space and science. So we have to work hard on movies to keep their attention. They want special effects they can believe. And they want to be dazzled."

And so the new *Star Trek* has had to change. One of the big differences you will see is in the new *Starship Enterprise*. "You see that the engine room is seven stories high," says Roddenberry. "You see the crew's recreation room. It's the size of a football field. You also get to see the whole crew—all 430 of them. In the old TV show, you never saw more than 10 at one time."

In the movie, computers are used to make many of the amazing special effects. This is the way they were done in the hit movies *Star Wars* and *Close Encounters*. In fact, some of the same experts who worked on those films have worked on the *Star Trek* movie, too.

The new, improved *Enterprise* flies through space. It is supposed to be larger than today's spaceships. But this "huge" ship is really a plastic model only four feet long!

The new movie cost about \$30 million. That's 3,000 times more than an episode of the old TV show cost back in 1969!

All this money figures to make *Star Trek* spectacular. But will it be scientific? To be sure, Roddenberry asked a space expert to help with the film. (You can read more about him on the next page.) "Science is so exciting," Roddenberry says. "It used to be you had to look over a whole lifetime to see changes in science. These days, big changes happen every couple of years." You will see some of these changes in *Star Trek: The Motion Picture*.

A make-up man puts the finishing touch on a *Star Trek* alien. Bottom, one of the hundreds of alien members of the Federation. Many of the aliens in the film are played by kids, Trekkies, who worked as extras in the film for a few days.

STAR TREK

A NASA SCIENTIST JOINS THE CREW

If you're making a movie and you need to know what the future will be like, what do you do? Simple. Ask an expert.

That's exactly what the makers of *Star Trek: The Motion Picture* did. They called in Jesco von Puttkamer. He is a NASA scientist who says proudly, "I spend my days in the future."

That's his job. He's in charge of NASA's Future Planning Studies. "I study all ideas of the future. Should we build solar labs? Could people build settlements on Mars? How many space stations do we need in orbit? Then I help other scientists decide which ideas are the most practical, the most helpful and the most important."

He has also spent the past five years talking with *Star Trek* fans about the space program and how they could help. Along the way, he became a *Star Trek* fan himself. "Star Trek is a possible view of the future," says Jesco. "It shows what people can do if they just get their act together."

Star Trek Scientist

While planning the new *Star Trek* film, Gene Roddenberry wanted a science expert. This person would make sure the movie's facts were right. "But I wanted someone who could see that the movie had to be exciting as well as correct," explains Roddenberry. "Jesco understood that."

Over the past four years, Puttkamer has met a number of times with the makers of the *Star Trek* movie. They asked him questions. "I came up with answers, based on my work for NASA," Jesco says.

One question was, "What will people need on very long trips into outer space?"

"At NASA, we have done research on this kind of thing," Puttkamer says. "We know small things can be important. The color of walls will matter. So will the type of lights on the ship and the way the food is packaged. I gave them information on food, dress and so on. Much of it was used in making the movie."





NASA future planning expert Jesco von Puttkamer (left) was science advisor on the *Star Trek* film. He helped the movie-makers decide the look and feel of many space gadgets, including the instrument panel (below, with Captain Decker).



Here are some other things that appear in the movie, thanks to Jesco's help:

Relaxing in Space: "At NASA, we found that the favorite non-work activity for astronauts was looking at Earth through a window," says Jesco. So the new spaceship *Enterprise* has six huge picture windows.

Space Travel: The *Enterprise* will fly in warp drive. This high speed way of flying is one way future spaceships may travel great distances. "The *Enterprise* will fly like an airplane when it's in warp drive," says Jesco. "At other times it will move more like a rocket ship. That's the way we think it will be."

Rockets and Other Space Vehicles: Most of today's space vehicles are bulky and a little dull-looking. But not in *Star Trek*. "I predict that in the future we will discover new light materials that are beautiful and useful," says Jesco. "So

the designers were told they could make the space vehicles as elegant as they wished."

Getting Started

Puttkamer first became interested in science when he was a boy in Germany. He read many science fiction stories. By the time he was 25 years old, he knew he wanted to come to America some day and work on the space program. He sent a letter to scientists at NASA. A few days later, he received a telegram. "Come right now," it read. "We are going to the moon!"

Puttkamer began working for NASA in 1961. He worked on the Saturn V rocket engine. That is the rocket that flew the astronauts to the moon.

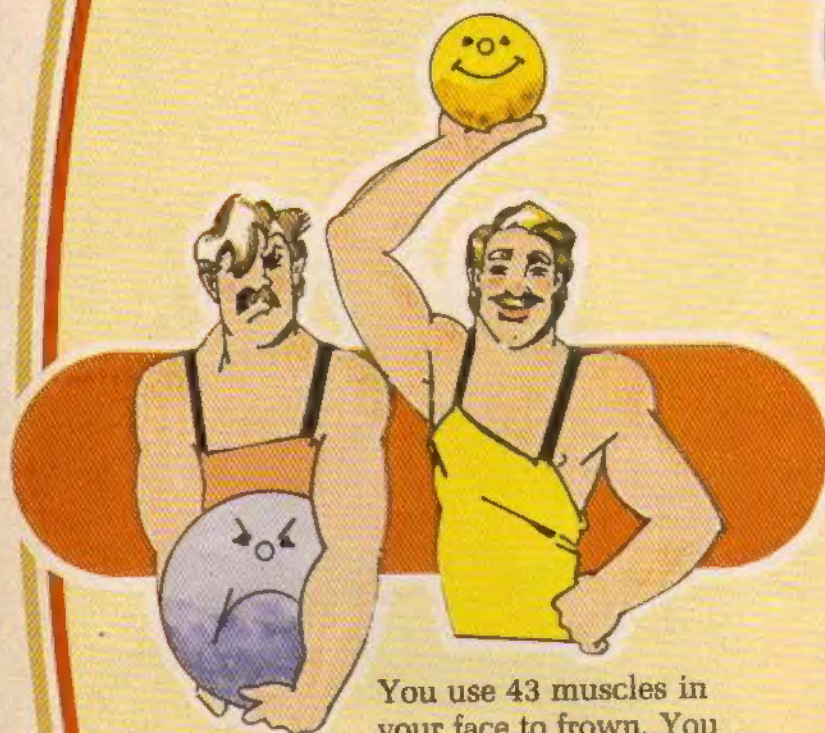
For the last five years, Jesco has been planning the future. He hopes that *Star Trek* will excite more people about outer space. "This film shows the future the way it could be, if we work towards it," he says. "I am hopeful that we will."

Factoids

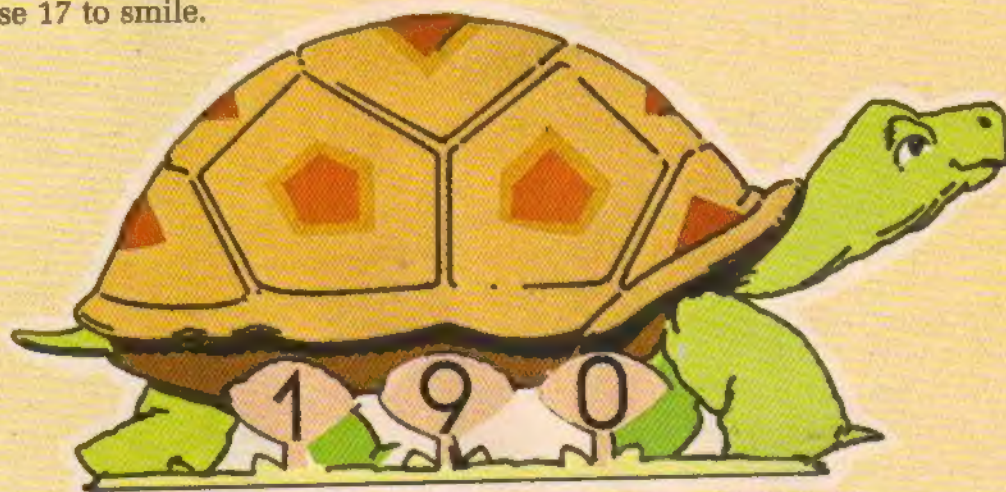
What are factoids? They are weird little facts that are stranger than strange, truer than true. Use them to wow your friends, amaze your family and dazzle your teachers.



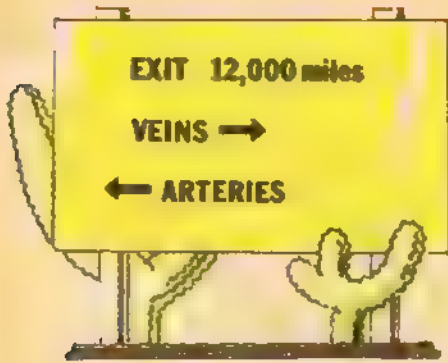
Most Americans eat about 20 gallons (75 liters) of ice cream each year.



You use 43 muscles in your face to frown. You only use 17 to smile.



The oldest animal, the giant tortoise, has been known to live 190 years.



If all the blood vessels in your body were put end to end, they would stretch 12,000 miles (19,300 km.) That's almost halfway around the world!



You share your birthday with about nine million other people in the world.



The wettest spot in the world is Mount Waialeale, Hawaii. Every year about 38 feet (12 m.) of rain falls there.



New-born opossums are so small that 20 of them can fit on a tablespoon.

Experiment

Predict a Snowstorm

Don't get caught in a blizzard this winter. You can make a simple barometer that will help you predict the weather.

What You Need

Two bottles or jars

A small piece of balloon

A drinking straw

Two rubber bands

A small ruler

What You Do

1. Stretch the piece of balloon across the top of the bottle. Use a rubber band to keep it in place.
2. Glue one end of the straw to the middle of the piece of balloon.
3. Using the other rubber band, attach the ruler to the other bottle. The biggest numbers should be on top.
4. Put the bottles near each other. The straw should point to the ruler. Your barometer should now look like the picture on this page.
5. Check and see where the straw points on the ruler. Write this number down. Check the straw again every few hours.

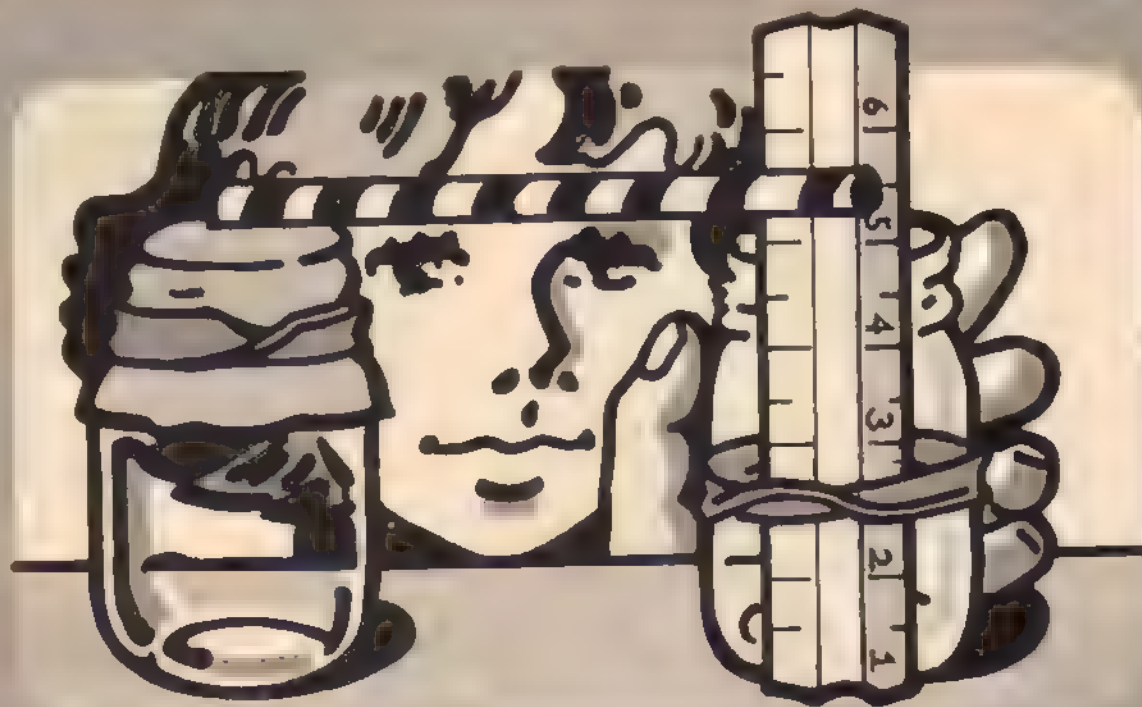
6. If the straw points lower and lower, there's a good chance it will rain or snow. The barometer is "falling." If it points higher, the weather should be nice and clear. In this case, the barometer is "rising."

Why It Works

All barometers measure how hard the air presses on the earth. That's known as air pressure or sometimes barometric pressure. Less pressure in the air means rainy or snowy weather is on the way.

As air pressure gets heavier, it pushes down on the balloon a little bit. The straw goes with it and, like a see-saw, the end near the ruler moves up. If the air outside is lighter, the air inside the bottle pushes up the balloon and straw. This time the end near the ruler goes down.

These ups and downs are mentioned by TV weather announcers. So the next time you hear someone say the barometer is "rising" or "falling," you will know what that means.





By Jerry Lazar

In a few weeks, the decade of the seventies will be over. Before it ends, here's a chance to take one last look at the past ten years. Turn the page and see our salute to the seventies.

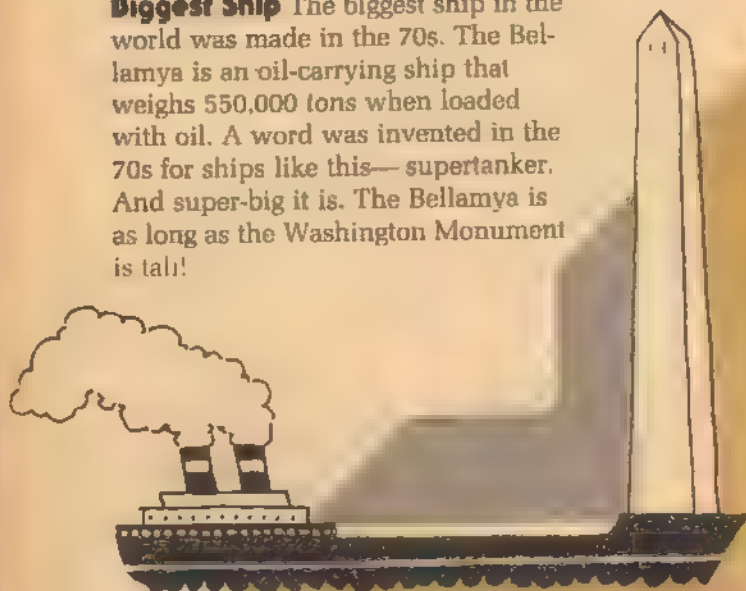
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List of the Month

Record Breakers of the 70s

Thousands of records were broken in the 1970s. People ran faster, jumped higher and built taller buildings than ever before. Here are eight record-breaking achievements of the last 10 years.

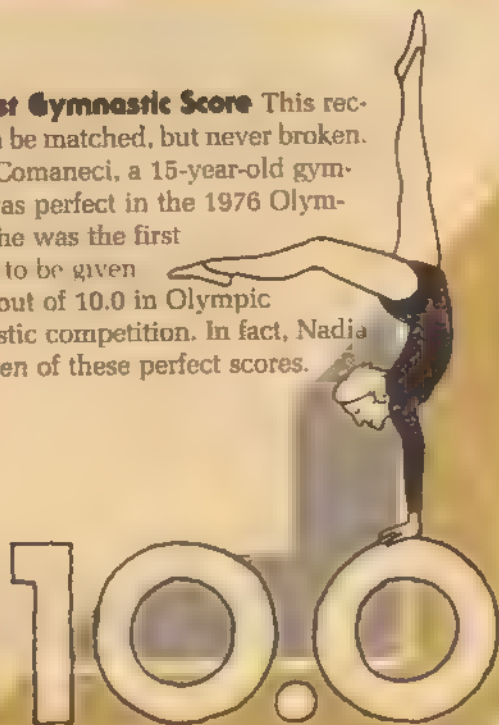
Diggest Ship The biggest ship in the world was made in the 70s. The Bel-lamya is an oil-carrying ship that weighs 550,000 tons when loaded with oil. A word was invented in the 70s for ships like this— supertanker. And super-big it is. The Bellamya is as long as the Washington Monument is tall!



Fastest Mile Sixteen miles per hour is a pretty slow speed for a car. A racehorse that couldn't go faster wouldn't be a racehorse for very long. But running at nearly that speed has made Sebastian Coe of England world-famous. It happened last July, in a race in Norway. Coe set a world's record in the one mile run. His winning time was 3 minutes 49 seconds.



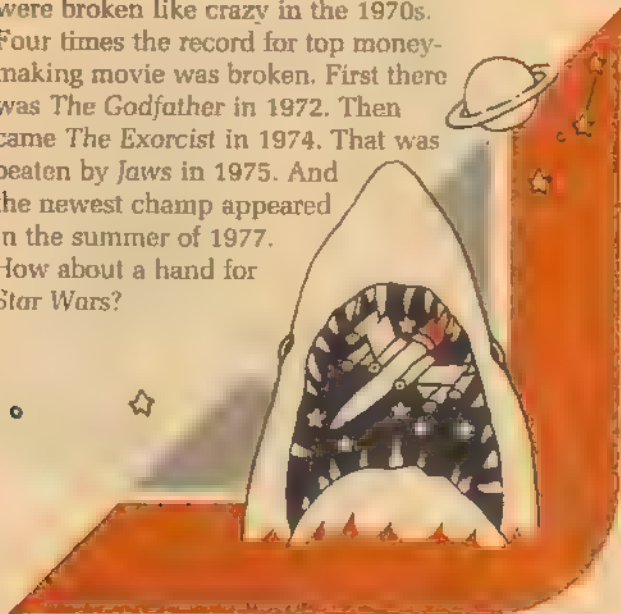
Highest Gymnastic Score This record can be matched, but never broken. Nadia Comaneci, a 15-year-old gymnast, was perfect in the 1976 Olympics. She was the first person to be given a 10.0 out of 10.0 in Olympic gymnastic competition. In fact, Nadia got seven of these perfect scores.



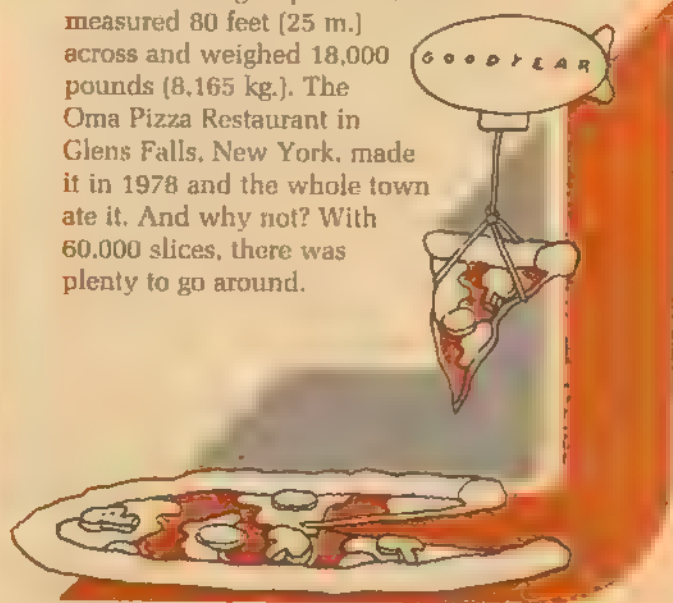
Diggest Indoor Stadium The biggest indoor stadium is the Superdome in New Orleans. Built in 1975, it stretches across 13 acres and can hold 76,000 cheering people for a football game. It's so large that the Houston Astrodome (another indoor stadium) could fit inside it. Now that's big!



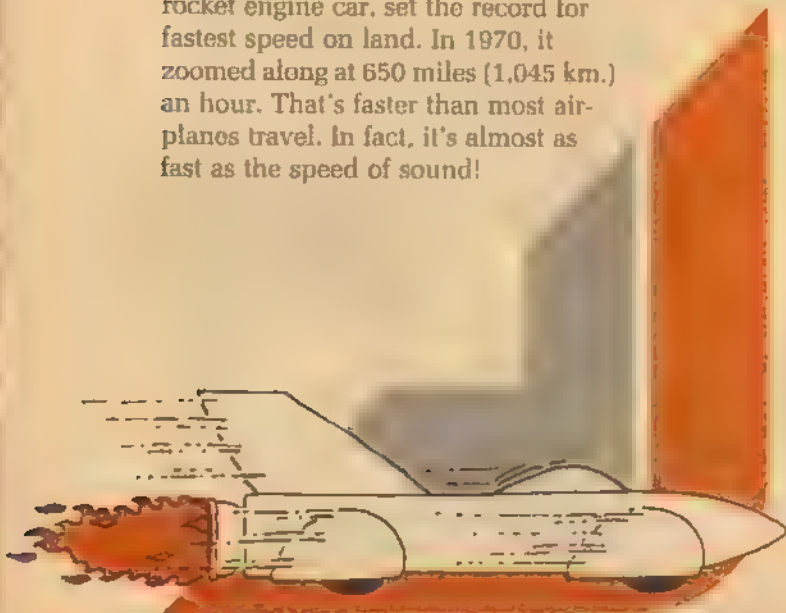
Biggest Movie Hit Movie records were broken like crazy in the 1970s. Four times the record for top money-making movie was broken. First there was *The Godfather* in 1972. Then came *The Exorcist* in 1974. That was beaten by *Jaws* in 1975. And the newest champ appeared in the summer of 1977. How about a hand for *Star Wars*?



Biggest Pizza Talk about stomach aches! The largest pizza ever made measured 80 feet (25 m.) across and weighed 18,000 pounds (8,165 kg.). The Oma Pizza Restaurant in Glens Falls, New York, made it in 1978 and the whole town ate it. And why not? With 60,000 slices, there was plenty to go around.



Fastest Wheels What's the fastest thing on earth? The Blue Flame, a rocket engine car, set the record for fastest speed on land. In 1970, it zoomed along at 650 miles (1,045 km.) an hour. That's faster than most airplanes travel. In fact, it's almost as fast as the speed of sound!



Tallest Structure The tallest thing ever built isn't a building. It's a giant radio antenna called the Warszawa Radio Mast, and it stands in Poland. Finished in 1974, this super-antenna is made of steel and is 2,120 feet (646 m.) tall. That's nearly half a mile, or almost twice as tall as the Empire State Building.

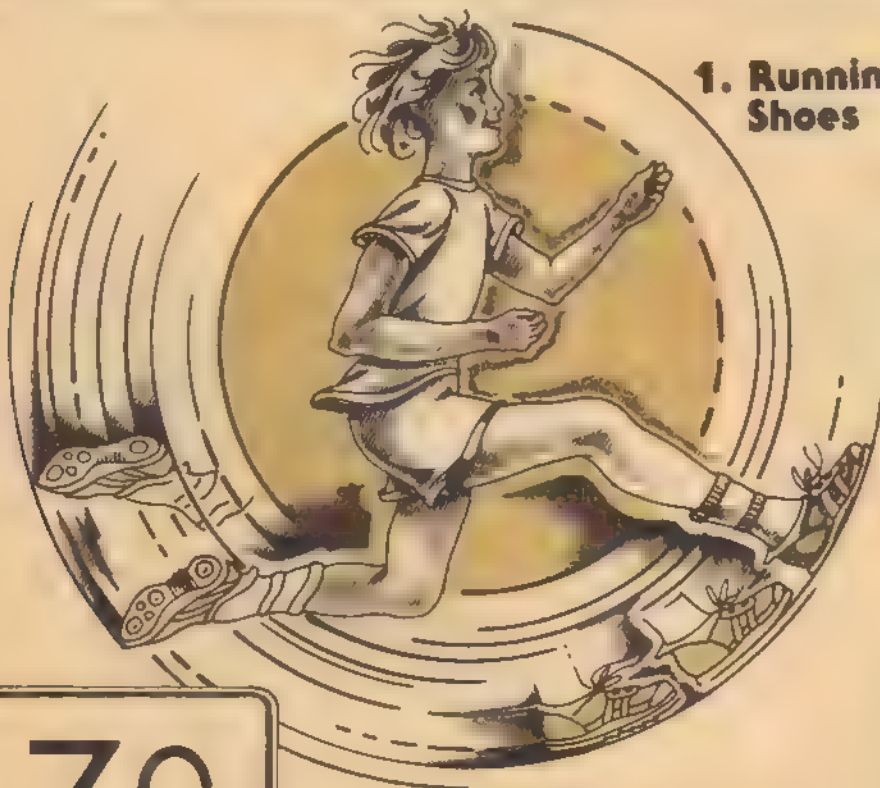


Ins and Outs of the 70s

A CONTACT QUIZ

Can you imagine a world without television? Probably not. But your grandparents can. When they were kids, people didn't have televisions in their homes.

In the 1970s, a lot of new developments changed your life. There were new discoveries and there were new fads. Four of the things on this page are definitely on the way in. The four others seem to be heading out. Do you know the ins from the outs?



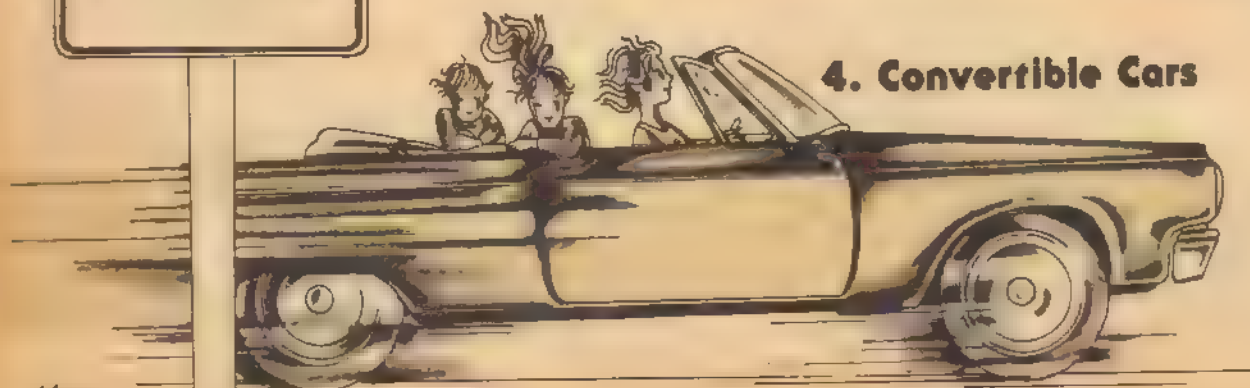
1. Running Shoes



3. Universal Price Codes



2. 70 Miles Speed Limit



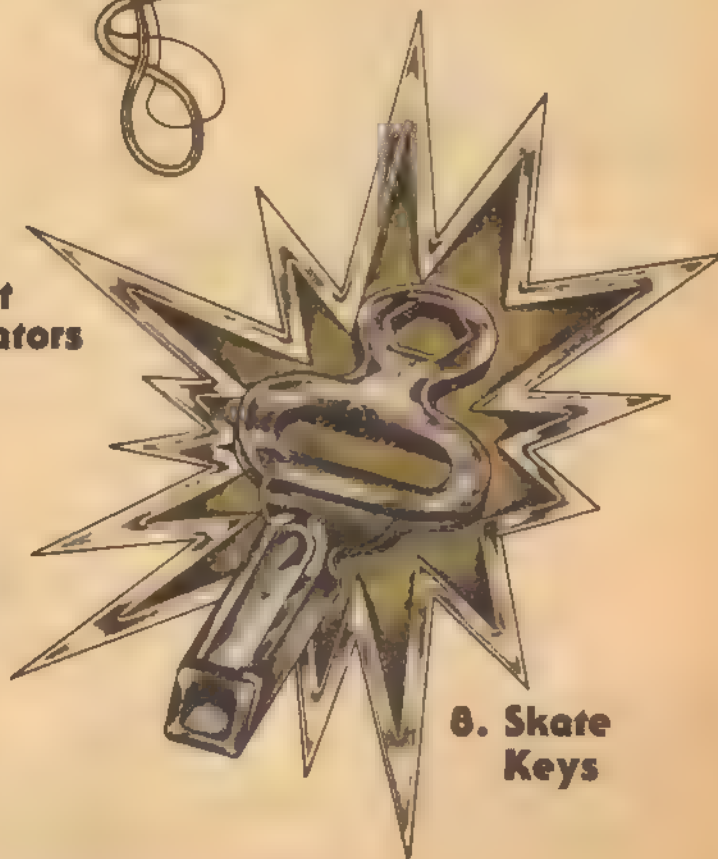
4. Convertible Cars

**5. Dial
Phones**



**6. Video
Discs**

**7. Pocket
Calculators**



**8. Skate
Keys**

Answers on the Next Page.

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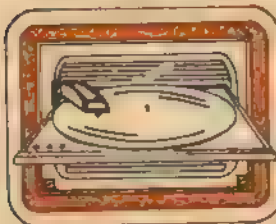
Ins



1. Running Shoes. Once you played all sports in plain old sneakers. But today, there's a special shoe made just for jogging. These sneakers have special bottoms for protection and comfort. They're more expensive than a pair of old "sneaks" used to be.



3. Universal Price Codes (UPCs for short). You've seen those funny-looking lines stamped on most things you buy. Compare a few UPCs. Each is a little different. A computer can "read" those differences. Then it provides a supermarket manager with information, like how much a box of something sells for, and how many boxes are left.

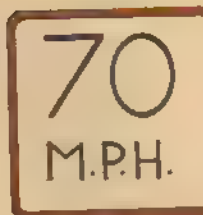


6. Video Discs. It used to be that a record album was just for listening to. No more. Now we've got video discs. These shiny records have hundreds of pictures in their grooves. When you play the video disc on its special player, you can watch and hear a movie or TV show. There are also special new programs made just for disc owners. Video discs may become popular in the 80s, but they were born in the 70s.



7. Pocket Calculators. Are you good at multiplication? OK then, what's 7,658 times 5,684? Quick! What's the matter, can't do it in your head? Well, it's all right. You can use a pocket calculator, which will do it for you almost as fast as you can punch in the numbers. Pocket calculators were made possible by the new way of making computer parts very, very tiny. By the way, the answer is 43,528,072.

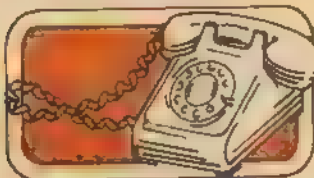
Outs



2. 70 Miles Per Hour Speed Limit. Before the energy crisis, cars zipped along highways at high speeds. There were lots of accidents and lots of gas was burned up. But nobody seemed to care when gas was cheap. Now that gas is hard to get, most states have made 55 miles their top speed. Slower-moving cars use less gas. Some people, of course, still drive at 70 m.p.h. They just get speeding tickets.



4. Convertible Cars. Cars with roofs that folded down were very cool in the 1950s. But an American convertible hasn't been built since 1976. For one thing, they were unsafe to ride in. And besides, a hard-top with a sun roof can do nearly the same job, without the risk.



5. Dial Phones. The most popular phone of the 1970s was the push-button kind. With dial phones, it takes as much as 15 seconds to dial a number like 555-8976. You can do it in about two seconds by punching those little buttons. Think of all the time you save in a year! Dial phones are still with us. But by the 1980s, who knows?



8. Skate Keys. There was a popular song in the early 1970s that went "I've got a brand new pair of roller skates, you've got a brand new key." But today, new skates aren't all metal and clunky. They fit like ice skates, and don't need a key for tightening. So the little skate key has begun to disappear. And nobody writes songs about it any more.

Fabulous Flops

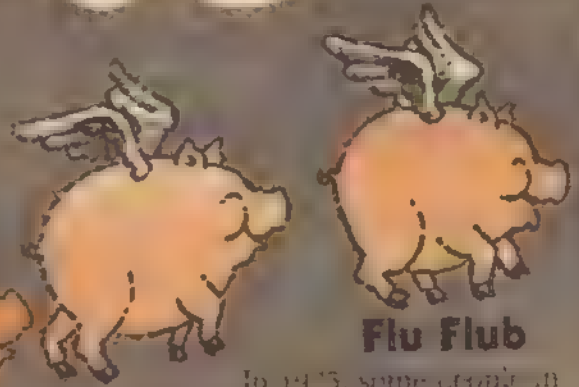
Everyone makes mistakes. Oops, we mean mistakes. Solving problems is hard and can end in error. After all, nobody's perfect. Here are five of the biggest mistakes to happen in the 1970s.

Watch Out Below!

Skylab went into orbit in 1973. This 77-ton satellite was supposed to keep circling the earth at least until 1981. By then, the space shuttle would be ready to fly up and solve any problems that might develop.

Unfortunately, Skylab's problems came three years too soon. It started falling. The space shuttle was still on the launching pad, unable to do anything about it. Skylab returned to earth on July 11, 1979. It broke into little pieces and crashed in the Australian desert. NASA was very embarrassed, and very lucky no one was hurt!





Flu Flub

In 1955, some people in New Jersey caught a new kind of flu, called the swine flu. Doctors were worried. Would it spread all over the country? President Gerald Ford swung into action. He announced that everyone in the country would get a free shot for protection.

But things went wrong. Some people got sick from the shot. And the disease never spread the way it was supposed to. The swine flu ended up costing taxpayers millions of dollars—enough to make anyone sick.



Who turned out the lights?

In November 1965, all the lights went out in the northeast part of the United States. For 12 hours, millions of people were without electricity. When "The Great Blackout" was over, people in charge of the electric companies swore it would never happen again. And it didn't... until 1977.

On July 13, the lights all over New York City went out again. It was a full day before things were normal. The people at the electric companies learned a valuable lesson. Never say "never."

78

79



It's a bird! It's a plane! It's . . .

Early in 1973, some scientists were excited. A very bright comet, named Kohoutek (ka-HOO-tek), was heading towards earth. When it arrived around Christmas time, it was expected to be one of the brightest, most beautiful comets ever

seen. But somewhere along the way Kohoutek lost much of its shine. When it passed near earth, people without telescopes could hardly see it. Later, scientists said they had not counted on certain possibilities that had dimmed Kohoutek's light.

But we only have two ears!

Have you ever seen a stereo with four speakers? That was another bright idea of the 1970s. It was called "quadraphonic sound" and it was going to replace two-speaker stereos in people's homes. Better music! Clearer sound! The stereo of the future!

There was one problem. Very few people bought these expensive new stereos. Almost no one bought the specially made quadraphonic record albums. Why have four speakers, if you only have two ears? Quadraphonic is still around. It is used in some places, such as movie theaters. But it's not the hit it was supposed to be.



Contact Us!

Predict the Future

Now that the 1970s are almost over, it's time to welcome the 1980s. Here's a chance to take your own look ahead. Below is a list of things that might happen in the future. Read each one. Then check one of the boxes next to it.

When you're done, send your answers to us. We will print the results in a future issue.

Send it to: **Predict the Future**
3-2-1 CONTACT
P.O. Box 2935
Boulder, Colorado 80322

It Will Happen Between 1980 and 1989	It Will Happen After 1989	It Will Never Happen
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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1. The price of one gallon of gasoline reaches two dollars.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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2. The first American woman flies in outer space.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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3. A new planet is discovered in our solar system.

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4. Thanks to a new scientific discovery, no one gets cavities anymore.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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5. Someone presents proof that the Loch Ness monster exists.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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6. The original Beatles—John, Paul, George and Ringo—get together for a performance.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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7. The California Condor is officially declared "extinct."

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

8. Your family buys its first car that runs on electricity instead of on gasoline.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

9. Color TV is so popular that no more black and white sets are being made.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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10. The population of the world (more than three billion in 1979) increases to four billion.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

11. The first tourists fly to the moon.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

12. Your family buys its first home robot.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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13. Because of the measles vaccine, there are no more cases of measles in the world.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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14. The age at which you can vote for president (18 in 1979) is lowered to 12.

Word Hunt Endangered Birds

The names of 15 different birds are in this word hunt. They are hidden across, down and diagonally. There are even four that are backwards. Can you find them? (Just look for the words in capital letters.) When you're finished you can find out more about one of these birds on page 40.

Word List

Masked BOBWHITE	Bald EAGLE	Santa Barbara Song SPARROW
California CONDOR	Peregrine FALCON	Trumpeter SWAN
Mississippi Sandhill CRANE	Hawaiian GOOSE	California Least TERN
Whooping CRANE	Florida KITE	Kirtland's WARBLER
Mexican DUCK	Thick-Billed PARROT	Red-Cockaded WOODPECKER



SUNDAY

MONDAY

TUESDAY

WEDNESDAY

Earth Days

December

2



Roller skates with ball bearing wheels are patented. (1884)

First human heart transplant (1967)

3

The Atlantus, the first U.S. ship made of concrete, launched. (1918)

4



5

9

10

11

The first radio signal is picked up across the Atlantic (1921)

16

Wright Brothers Day. It's the anniversary of their famous flight in 1903.

17

18

The first Thanksgiving Day is held (1777)

19

23

24

A family in Dover, Massachusetts, moves into the first sunheated house (1948)

Happy Birthday, Sir Isaac Newton, discoverer of the law of gravity. (1642)

25

26

30

Thomas Edison gives the first public demonstration of the electric lamp. (1879)

31



ESDAY

THURSDAY

FRIDAY

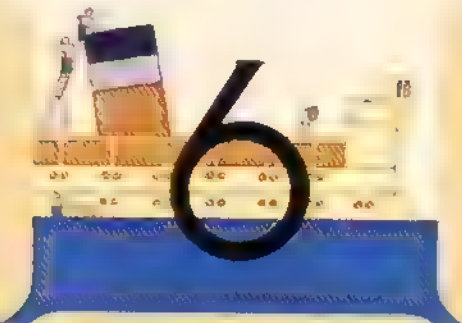
SATURDAY

mber

First trip
in a balloon
filled with
hydrogen gas. (1763)

1

5



6

7

8

12

13

14

Tonight
in the sky is
Geminid Meteor Shower.

15

9

20

U.S. spacecraft
Apollo VIII
orbits moon.
The far side
of the moon
seen for the
first time.
(1968)

21

The Winter
Solstice.
The first
day of
winter.

22

6



27

Happy Birthday,
Louis Pasteur,
inventor of
"pasteurized"
milk (1862)

Chewing gum
is officially
invented
by W.F. Semple.
(1869)

28

29

Highlight of the 1980s **HALLEY'S COMET**

by Douglas Colligan

Over 2,000 years ago, an astronomer in China looked up and saw an amazing sight. Something that looked like a giant streak of light was reaching across the sky. Today we know that was a comet, one called *Halley's comet*. We also know that in 1986 it is going to make one of its rare visits to our part of the solar system. We will then be treated to weeks of comet-watching.

The Mysterious Comet

In the past, comets were mysterious, frightening objects. Many people believed that the long streaks of light in the sky were really the fingers of an angry god pointing towards Earth. They thought that was a sign that war or some other disaster was about to happen. Today, we know there are hundreds of comets in our solar system. Most of them are not very bright or exciting.

But Halley's comet is different. Because it looks so spectacular, its arrival has always been an exciting event. Over 900 years ago, it made an especially dazzling appearance. A picture made in the year 1066 shows King Harold of England falling off his throne in amazement as he looks up at the sky.

Even in 1910, the last time the comet appeared, people acted strangely. Many were convinced they would die from gasses given off by the comet. Some brought special "comet pills" to protect themselves. Others had "comet parties" to celebrate their last days on Earth.

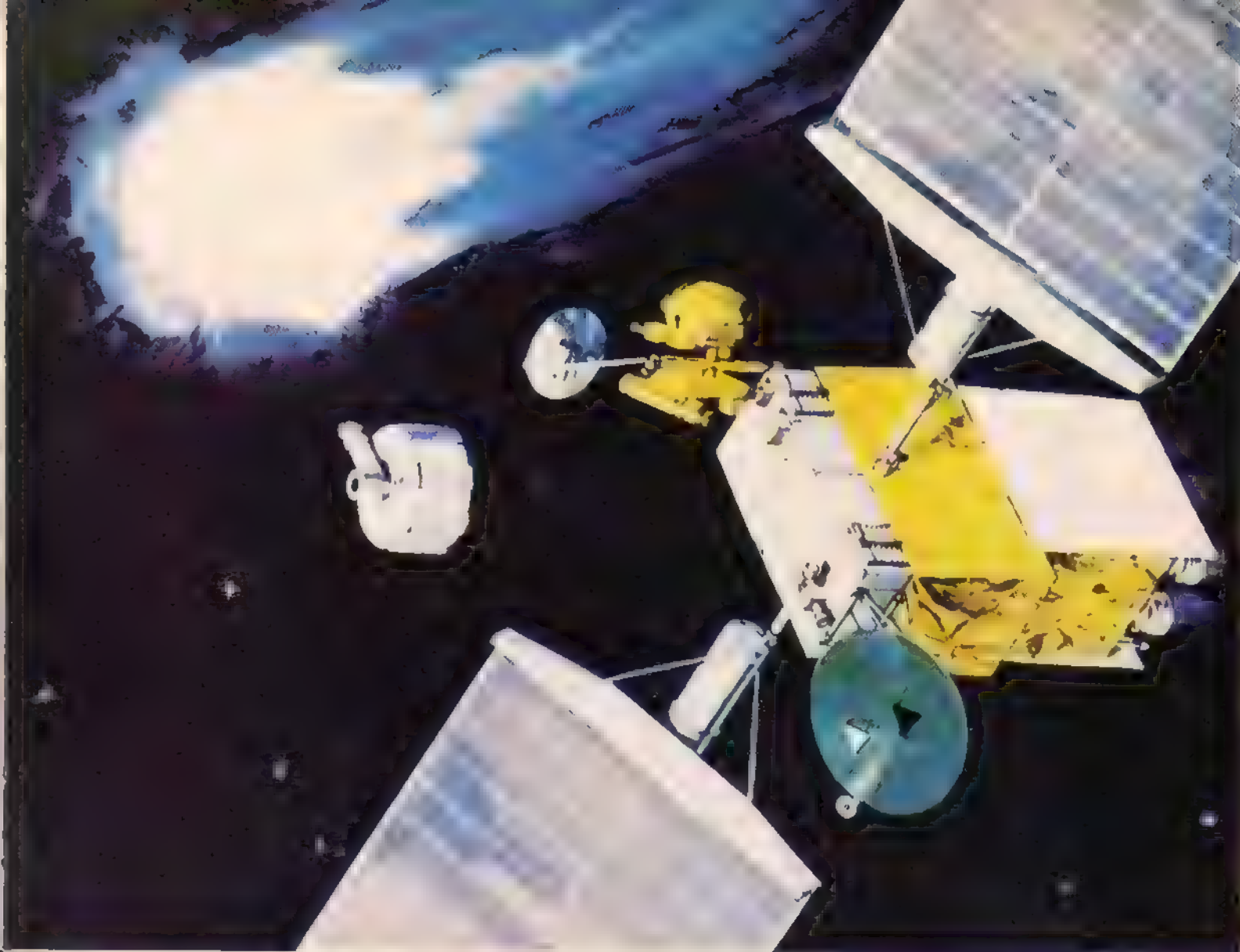
Flying Dirty Snowballs

There was really nothing to be afraid of. Scientists agree that Halley's spectacular comet is probably nothing more than a "dirty snowball." It's a huge chunk of ice with cosmic dust, bits of rock, and different gasses frozen inside. The entire comet is only 10 miles wide, but it leaves an incredible line of light 100 million miles long in the sky. This line of light is its tail.

Halley's comet gets its name from an English astronomer named Edmund Halley, who saw it only once, in 1682. In his time, scientists did not think comets appeared at any special time. Halley was not so sure they were right. For one thing, he thought the 1682 comet was suspiciously like three other comets astronomers had spotted in the years 1456, 1531, and 1607. For another, Halley's friend, the scientific genius Isaac Newton, had proved planets were locked in special orbits by the sun. Halley thought the same might be true for comets. (continued on page 28)

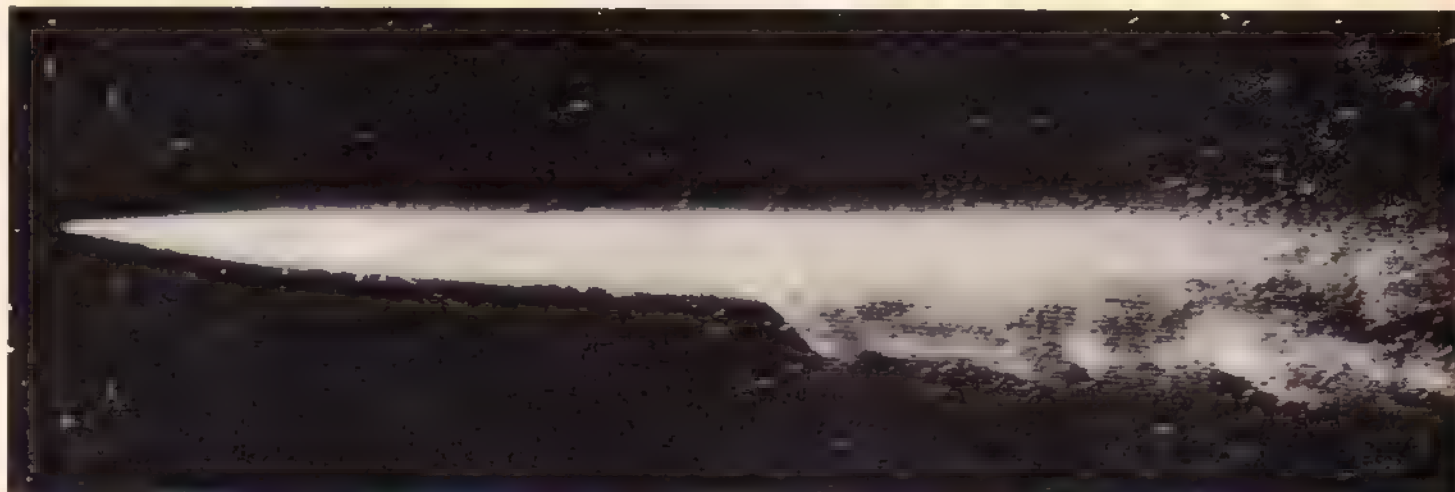
The last time Halley's comet appeared was in 1910. Below is an artist's picture of the excitement it caused.

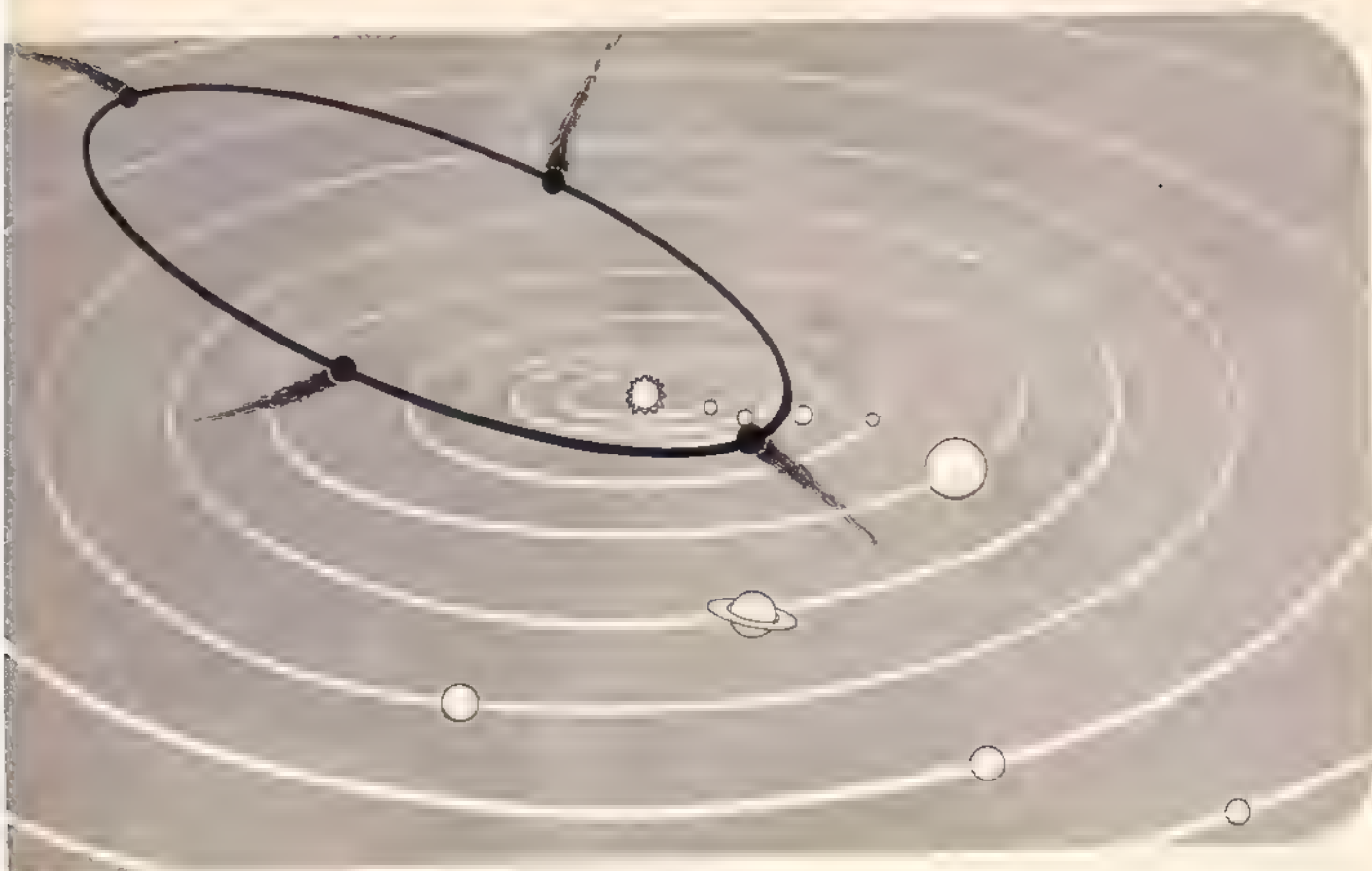




Every 76 years, scientists prepare for the arrival of Halley's comet. And, thanks to advances in science, each visit provides more information. The photo below was taken when Halley's comet came in 1910. It was the first time since the invention and development of photography that the comet

had come. The 1986 arrival will be the first visit by Halley's comet in the space age. The picture above shows what might happen. A NASA Space probe has been sent to meet the comet. When it comes around the sun, the probe will give scientists their closest-ever look at the comet.





This diagram shows the orbit of Halley's comet (black line) and four of its positions as it circles the sun. Notice how different the comet's orbit is from the orbits of the planets. You can also see that wherever Halley's comet is on its 76-year trip, its tail always points away from the sun. The tail is blown outwards by solar wind—gas shot out from the sun. The same thing happens to all other comets as they come near the sun.

After studying the situation and the numbers involved, Halley said that the 1682 comet and the other three were the same comet, not four different ones. This comet travelled in a long, lopsided orbit around the sun. It came by the Earth every 75 or 76 years. If his theory was right, he said, the next time the comet would return would be in 1758. On Christmas night, 1758, 16 years after Halley died, his comet came back. Ever since then, it has carried his name.

Astronomers now believe Halley's comet travels almost to the edge of our solar system. At its farthest, it is 3,180 million miles from the sun, beyond the planet Neptune. When it returns, it zooms in close to the sun—only 56 million miles away.

Something Strange Happens

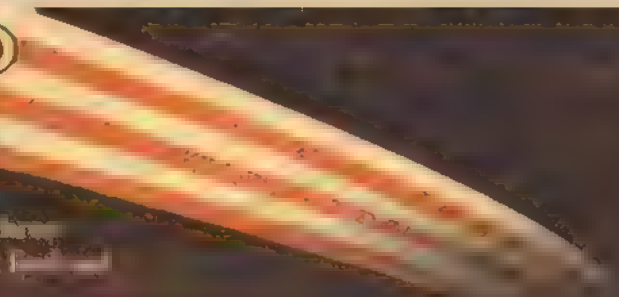
When a comet passes by the sun, things start happening. Its center chunk of ice, called the nucleus, evaporates a little bit. This creates a strange glowing cloud, called the coma (KOH-ma),

which surrounds the nucleus. That coma gets stretched out as the comet moves through space, and the result is the tail, the third part of a comet.

Eventually, all comets fade away from too many trips near the sun. They leave behind clouds of space rocks and dust. Every so often, the Earth brushes up against one of these clouds. When it does, bits of dust burn up in our atmosphere. When you see shooting stars at night, often what you are actually looking at is a tiny piece of a comet on fire. These pieces of fiery comet are often no bigger than a fingernail.

Fortunately, Halley's comet is not about to disappear. It will return in 1986, right on schedule. It won't look as bright as it did in 1910. This time it won't come quite as close to the Earth. What you will see will be more like a moving dot of light. Without a telescope, you will have about two weeks to get a good look at it. The best time to see it will be late at night. Be sure to take a peek. After all, you won't get another chance to see it until the year 2062! **==**

COMET MAZE



spaceships can make it up to the comet. To find out
which one does, follow the paths



Answer on
page 46

Contact



The proud inventor of the world's gooiest ink.
It's a million times thicker than water!

Eraser Mate Ink You don't have to worry about handing in messy homework assignments anymore. A new ball-point pen has been invented. It makes it easy to correct your mistakes. It erases, just like a pencil.

It's called the Eraser Mate and the secret is in the ink. The inventors got their idea from rubber cement. That gooey stuff sticks to paper. But when you rub it, it lifts right off. So the pen's inventors put some of the ingredients in rubber cement into their new ink. When you erase, the sticky ink lifts right off the page.

The amazing ink is one million times thicker than water. That caused another problem: how can you get this thick stuff out of a pen? The inventors built a special holder or refill for the ink. Now the ink comes out evenly.

There is still one problem with the pen. If you make a mistake, don't wait too long to erase it. After a few days the gooey stuff dries. Then it's as impossible to erase as regular ink.

Leif's Penny On Christopher Columbus' birthday you get off from school, but on Leif Ericson's you don't. Maybe it should be the other way around. There's more proof than ever that Leif and the Vikings came to America first. The newest evidence is a 900-year-old penny.

The coin was found in Maine in 1961. It was donated to the Maine State Museum in 1974. Experts there thought it was an old English coin. But they were wrong.

This year, Dr. Kolbjørn Skaare, a coin expert from Norway, discovered that the coin was not British. It was an ancient coin from Norway, the land of the Vikings.

About the size of a dime, the chipped coin is made of silver. It has an animal's head on one side and a cross on the other.

The worn-down coin was made in the year 1070. That's more than 400 years before Columbus came to America! It probably means that long before Columbus arrived, there was at least one Viking walking around America with a hole in his pocket.



An old penny provides new news.

Report



A hairball at work.

Why Is This Chicken

Laughing? Move over hard-boiled eggs! Here comes the long egg. It's specially made to give you a perfect slice of egg every time.

A machine makes the long egg from regular eggs. It hard-boils the yellow and white parts and then puts them together in the new shape. Up to 500 long eggs can be made in an hour.

Why would anyone want to bother? Long eggs are easy to slice, they don't break and you can freeze them. Now isn't that egg-citing news?

What's that? Have you seen a story in a newspaper or magazine that belongs in the Contact Report? Why not clip it and send it to us? Be sure to include your name, age, address, and the place you found your story. Send it to:

The Contact Report
3-2-1 CONTACT
P.O. Box 2935
Boulder, Colorado 80322

Fuzzy Trees Your hair is more than a rug for your head. At a plant nursery in New York, human hair is actually saving the lives of 1,000 trees and bushes.

The leaves of the plants at the Cary Arboretum (ar-bo-REE-tum) were being eaten by deer. Without their leaves, the plants were dying. But deer don't like the smell of human hair. So scientists at the arboretum tied small balls of hair to the trees. They hoped the deer would smell the hair and leave the trees alone. It worked!

Jay McAnich, a scientist at the arboretum, explains that the idea is not a new one. "American Indians protected their food this way," he says. "They would spread their hair on the ground near the crops and the deer would not bother them."

The arboretum gets its hair from a company that runs beauty parlors across the U.S. So the next time you have to go to the barber, cheer up. You're not just getting your hair cut. You might be saving a tree!



A regular hen meets an irregular egg.

Any Questions ?

How does your body know when to grow?

You may not know it, but your body is growing all the time. It will keep growing until you're around 20 years old. Yikes!

Hormones tell your body when to grow. They are substances that are made in parts of your body called glands. Hormones send messages to the cells and organs inside you. One special hormone is called the "growth hormone." It takes care of growing until you are around 11 or 12 years old.

How come people who are growing along nice and slow, suddenly spurt up around the age of 12? At that time, new hormones are produced. These increase the rate at which you are growing and help your body develop even more.

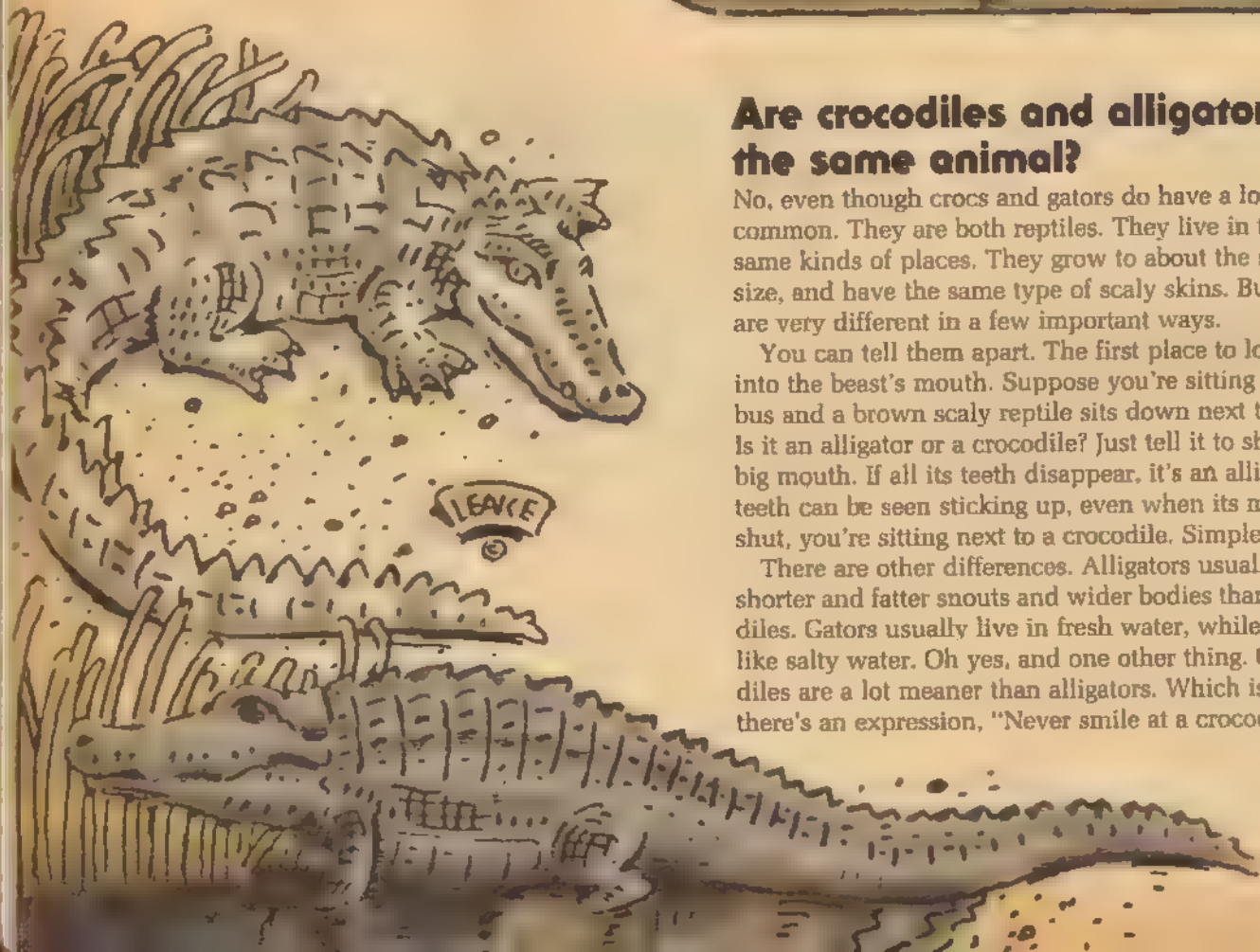


Are crocodiles and alligators the same animal?

No, even though crocs and gators do have a lot in common. They are both reptiles. They live in the same kinds of places. They grow to about the same size, and have the same type of scaly skins. But they are very different in a few important ways.

You can tell them apart. The first place to look is into the beast's mouth. Suppose you're sitting on a bus and a brown scaly reptile sits down next to you. Is it an alligator or a crocodile? Just tell it to shut its big mouth. If all its teeth disappear, it's an alligator. If teeth can be seen sticking up, even when its mouth is shut, you're sitting next to a crocodile. Simple!

There are other differences. Alligators usually have shorter and fatter snouts and wider bodies than crocodiles. Gators usually live in fresh water, while crocs like salty water. Oh yes, and one other thing. Crocodiles are a lot meaner than alligators. Which is why there's an expression, "Never smile at a crocodile."



Is there something that you have been wondering about, for which you can't seem to find an answer? We just might be able to help. Send your question along with your name, age and address to:

Any Questions?
3-2-1 CONTACT
P.O. Box 2935
Boulder, Colorado 80322

Why is the ocean salty?

You may not know it, but rivers are salty, too. In fact, that's where most of the salt in the ocean comes from.

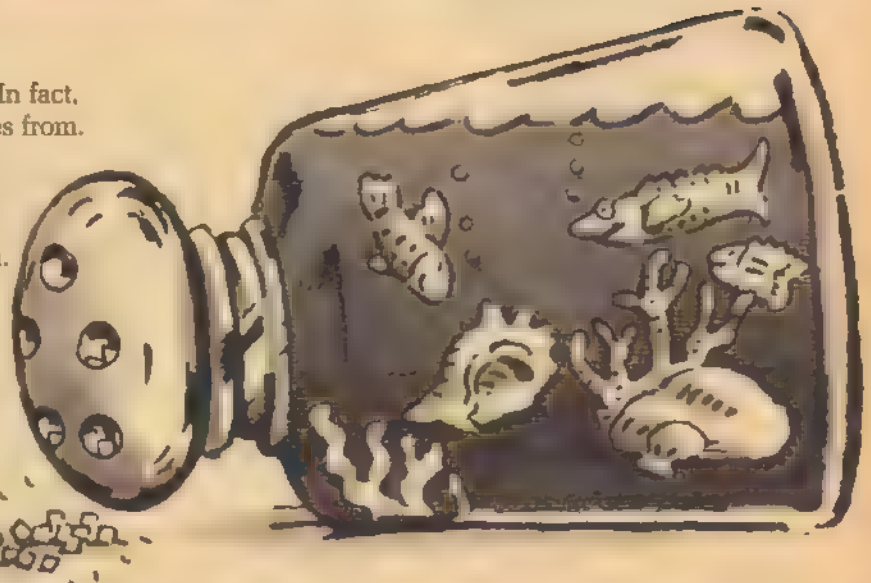
Here's how it works. Rivers wash over rocks and soil on their way to the ocean. When they do, they pick up tiny amounts of salt. These rivers dump their salt and water into the ocean.

Wait a minute! That doesn't explain anything! Oceans are much saltier than the water pouring in from the rivers.

That's right. But you have to take into account evaporation. The sun shines on the oceans and water evaporates. But the salt stays behind. After millions of years, all that salt adds up.

All kinds of plants and animals live in the ocean. But when water gets too salty, nothing can live in it. The Dead Sea is a perfect example.

How salty is too salty? You can find out what the Dead Sea tastes like. Put three tablespoons of fresh water in a glass. Add one tablespoon of regular kitchen salt. Stir well and take a sip. Ugh! No wonder they call it the Dead Sea!



Why do people get goose bumps?

Goose bumps (also called goose pimples) are caused by tiny muscles. These muscles are around each of the little hairs that cover your body. When these muscles pull in, they form little bumps and your hair stands on end. You also get a tingling feeling all over.

You usually get goose bumps when you are frightened or when you are chilly. It's automatic. You can't stop it from happening.

The same thing happens to many animals. Take cats, for instance. When frightened, their hair puffs out and they look bigger—the better to scare off an enemy. Their hair also puffs out when they are cold. This traps the air. That, plus their body heat, helps warm them up. You can't see a cat's goose bumps, because their hair is too thick. Say, maybe they ought to call them cat bumps?

Reviews & Previews

Movies There are a bunch of new movies due out soon. One that is sure to keep you smiling is called *The Jerk*. It stars that "wild and crazy guy," Steve Martin.

If science fiction is more for you, you won't want to miss *The Black Hole*. You'll get a preview of this space thriller in next month's 3-2-1 CONTACT.



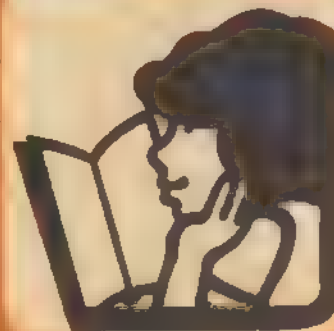
Book Did you know that alligators and crocodiles are some of the oldest animals on earth? They can trace their roots to the dinosaurs. For more on them, read *Alligators and Crocodiles*. It's written by Herbert Zin and published by William Morrow and Co. It's full of pictures that will give you a close (but safe!) look at crocs and gators.



Book Halley's comet is just one of the comets in our solar system. For more on some of the others, look for *How Did We Find Out About Comets?*, by Isaac Asimov and published by Walker and Co. This book is recommended for fifth graders or older. Look for it in your bookstore or library.



Book On page 20, you had a chance to predict the future. But making predictions isn't always guesswork. For more on that, read *Probability: The Science of Chance*, by Arthur Razzell. It's published by Doubleday and Co. Look for it in your bookstore or library.



Something Free

You can find out more about the California Condor and other animals. Write to:

Education Division
National Wildlife
Federation

1412 16th St. N.W.

Washington, D.C. 20036

Ask for set #1 of *Wildlife Notes*. You will get information on six animals, including the condor. If you like what you get, there are five more sets you can write for.



Museum You know that great episode of *Mork and Mindy* you missed? You can still see it. It may be one of the TV and radio shows you can see at the Museum of Broadcasting.

The museum works like a library. You look through a card file for the show you want to see. Then you get to watch that show in the museum.

There are more than 3,000 shows in the museum. You
(continued below)

Something Free

Now that it's winter, that pond near your home should be freezing over. How thick must it be for skating? Find out by reading the *Ice Skating Safety* fact sheet. It's full of things you should know before stepping out on the ice. Write to:

Boy Scouts of America
Safety Programs
North Brunswick,
New Jersey 08902



TV Show Egypt's Nile River is the longest river in the world. It is also one of the most mysterious. Scientist Jacques Cousteau made a trip there last year. For more on what he found, watch *Cousteau Odyssey* on December 9th and 10th. Check the newspaper for the right time and channel where you live.



can see everything from the first steps on the moon to the first American TV appearance of the Beatles.

The Museum of Broadcasting is in New York City. If you can't get to it, why not visit a museum closer to home? After you do, write us about it. Send your 100 word story to:

Reviews and Previews
3-2-1 CONTACT
P.O. Box 2935
Boulder, CO 80322

Hair

This month's *Busy Bodies* is about the fuzzy stuff on top of your head. Actually, you have hair almost everywhere. The only parts of most people that are hairless are the bottoms of their feet, the palms of their hands and (thank goodness!) their lips.

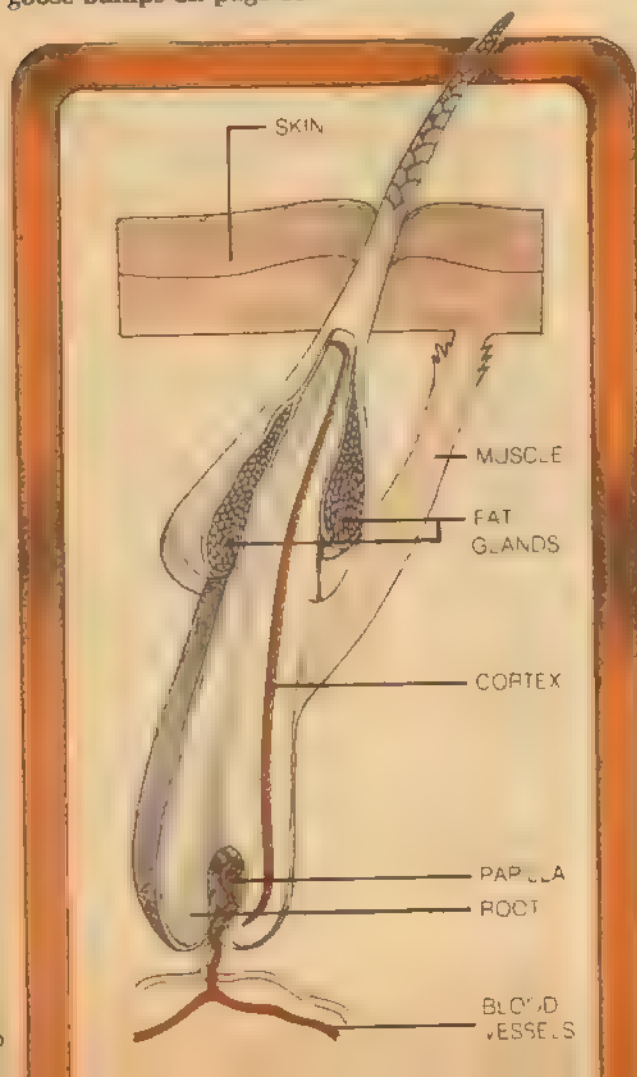
Its Job

Hair's main job is to protect your body. It keeps the top of your head warm in winter and sunburn-free in summer. All year round, it protects your head from bumps and bruises.

Even a little hair can do a lot. The hair in your nose (yech!) and ears (no kidding!) keeps dust and dirt out of your lungs and inner ear. Eyelashes and eyebrows do the same job for your eyes.

Finally there is the carpet of tiny hairs that covers your body. These alert you to all sorts of

Below: This is what every hair on your body looks like underneath the skin. The fat glands produce oil, which keeps each hair soft and smooth. For more on what the muscle does, read about goose bumps on page 33.



danger—everything from a blast of chilly air, to a bee strolling up your arm.

Meet Your Hair

It's time to take a good close look at your hair. First take one of your hairs and pull it out. Don't worry. If you take only one and pull fast and hard, it won't hurt. And, since you have around 100,000 hairs on your head, you'll never miss it.

Run your finger along this hair. It feels smooth, but it isn't. Each hair is really a series of scaly cells piled one on top of the other.

These scales are made out of something called keratin (KER-uh-tin). This sturdy little protein isn't just found in your hair. It also makes up the nails on your fingers and toes. But wait, there's more. Keratin makes up the horns and hoofs on animals, the scaly skin on snakes, and the feathers and claws on birds. It's some heavy stuff!

How Hair Grows

Look at your strand of hair again. On one end is a white, bulb-shaped part. This is the root. The root is the part of the hair that is inside your head. It receives nourishment from your body and produces keratin. The new scales of keratin push up through tiny openings in your head, and your hair grows.

Hair-Raising Facts

1. During a person's lifetime, about 25 feet of hair grows on his or her head.
2. You lose as many as 100 hairs from your head every day. But it's okay. While you're young, new hair grows and replaces them.
3. Your hair grows faster at night than during the day. It also grows faster in warm weather than in cold.
4. Not all your hair is growing at the same time. Each hair grows for two to six years. Then it stops for a few months. Then it starts again. Since all your hair doesn't rest at the same time, there is always plenty sprouting up to keep your barber busy.

BUSY BO

What Makes Hair Curly?

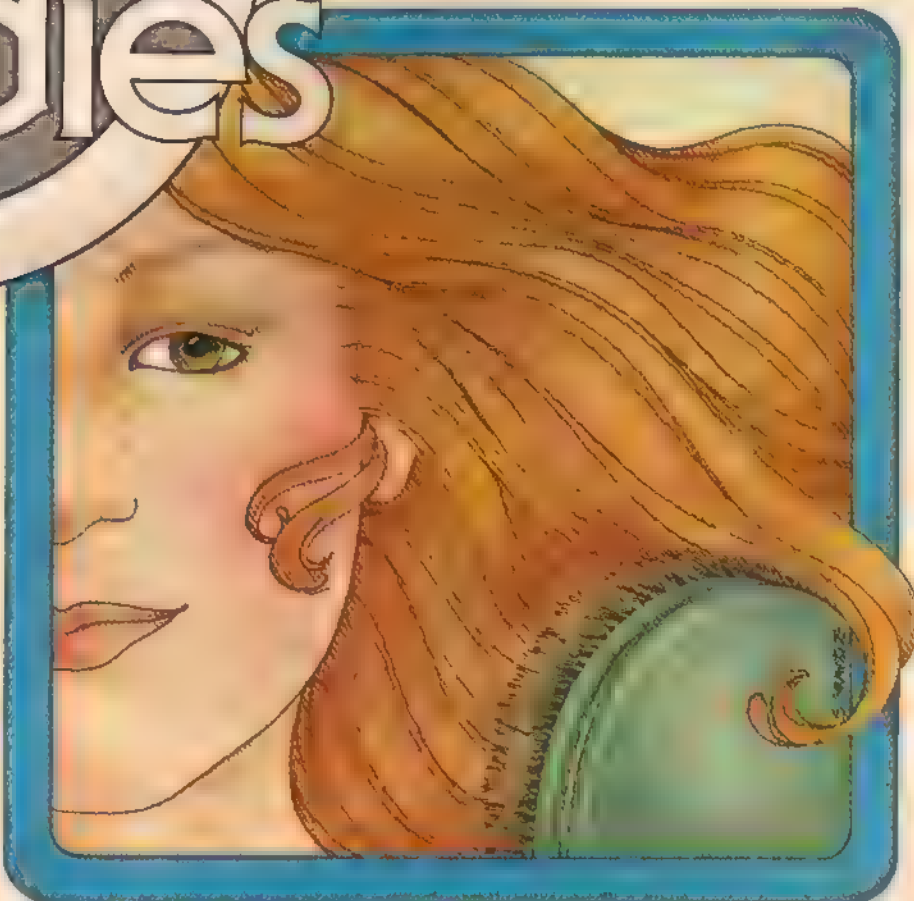
Remember we said that your hair grows out of tiny holes in your head? These holes, which are too small to see, are called **follicles** (FOLL-ick-uls). They make your hair curly or straight. Follicles come in three different shapes. As the hair grows through them, the follicles make it fit their shape. If your follicles are round, you will have straight hair. If they are egg-shaped, your hair will be wavy. And if they are shaped like little slots, that's when you have curly hair.

Even though you can straighten and curl it, you can never really change the shape of your hair. You just can't change those stubborn little follicles. Eventually, your hair will take its original shape.

Hair Color

Running along the center of each hair is the **cortex**. This is where the color of your hair is located. There are three different colors in the cortex—black, red and yellow. They mix together to form the different hair colors—black, brown, red and blonde.

The colors in your cortex are determined by heredity. In other words, the hair color of your parents and grandparents helps decide what your hair color will be.



dies

Hairdos of History

People all over the world have been doing things to their hair for thousands of years. They have cut, curled, pinned, braided, rinsed and who-knows-what-else their hair. The following are some of the great and near-great hairstyles of history.

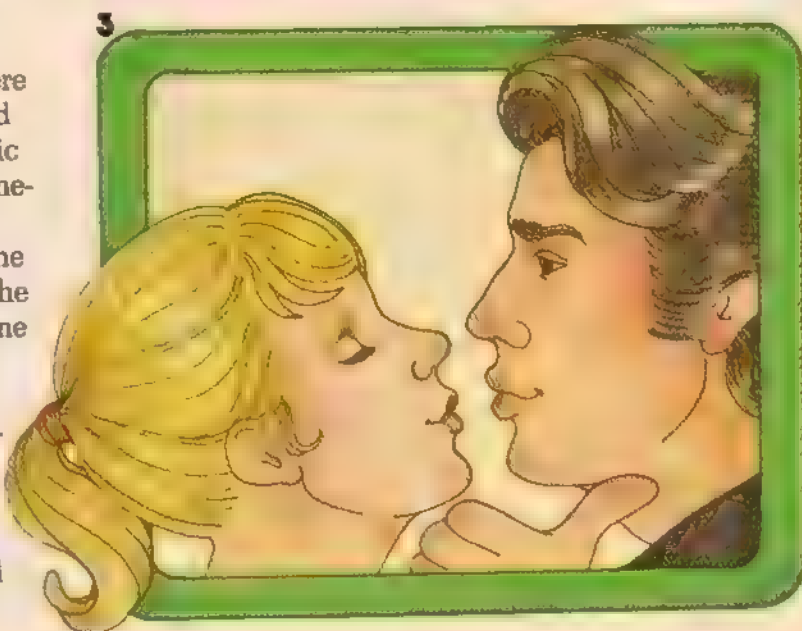
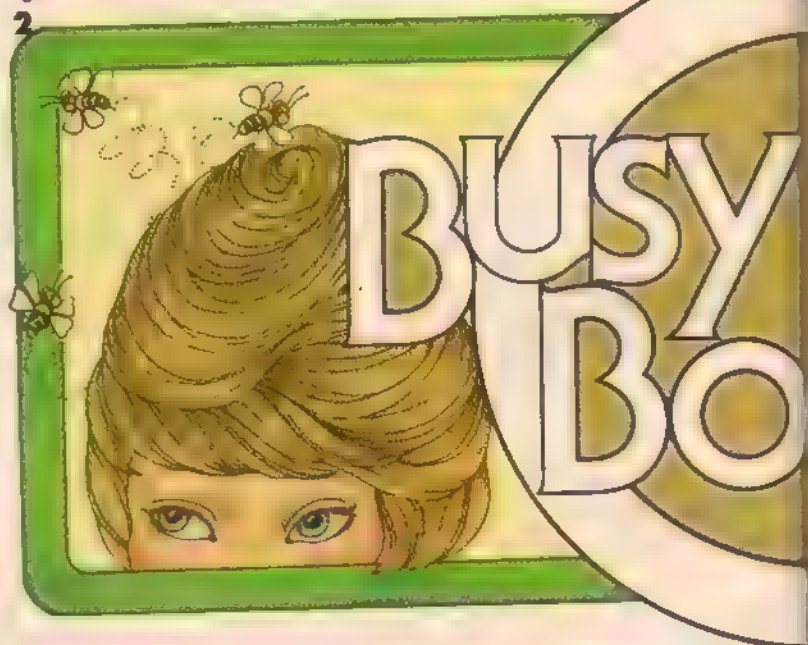
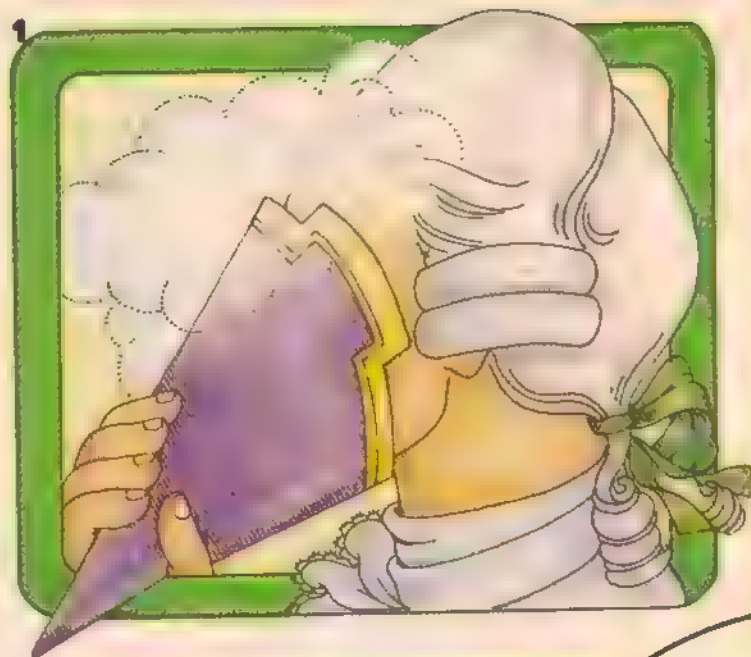
1. The Powdered Wig For the wealthier people in the 13 colonies, wigs were the only thing to wear. In 1720, a trip to the barber meant getting a shave and having your wig powdered. A man had to hold a funnel-like gadget over his mouth and nose while his wig was powdered. Otherwise, he couldn't breathe. Women also wore wigs but were not permitted to go to barbers. So they took care of their hair at home.

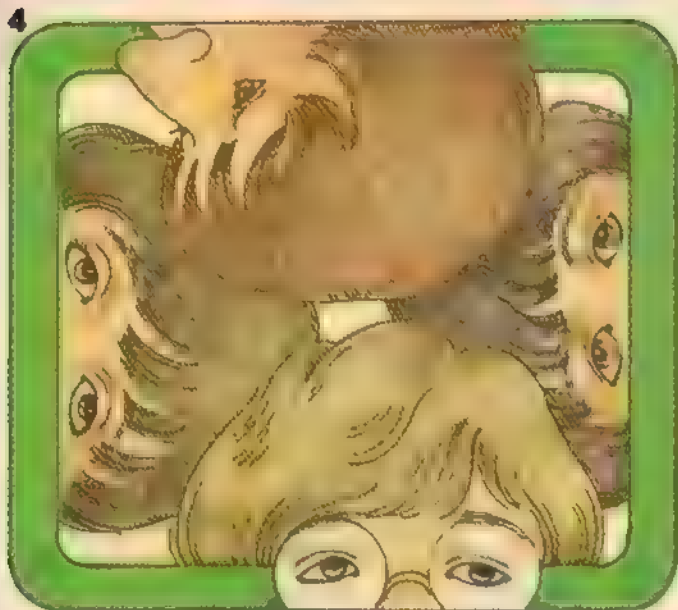
2. The Beehive Why would anybody want to style her hair to look like a beehive? In the 1950s this hairdo was supposed to make short women seem taller. What better way to set a room filled with people buzzing!

3. The Fonx and The Ponytail The greasy look of the 1950s has returned. And right alongside it, what else but a ponytail? These two hairdos have made a comeback, thanks to movies and TV shows celebrating those happy days!

4. The Beatle Cut Before Beatlemania, there were the Beatles. John, Paul, George and Ringo rocked the world with their music and their haircuts. They looked as if someone had put a bowl on their heads and snipped around the edge. No matter. The Beatle cut was a hit, and kids all over the world started wearing their hair the same way.

5. The Afro As Afro-American culture became more known, this hairstyle became more and more popular. The idea was simple. Let your naturally curly hair show. This look, still around today, began catching on in the 1960s.





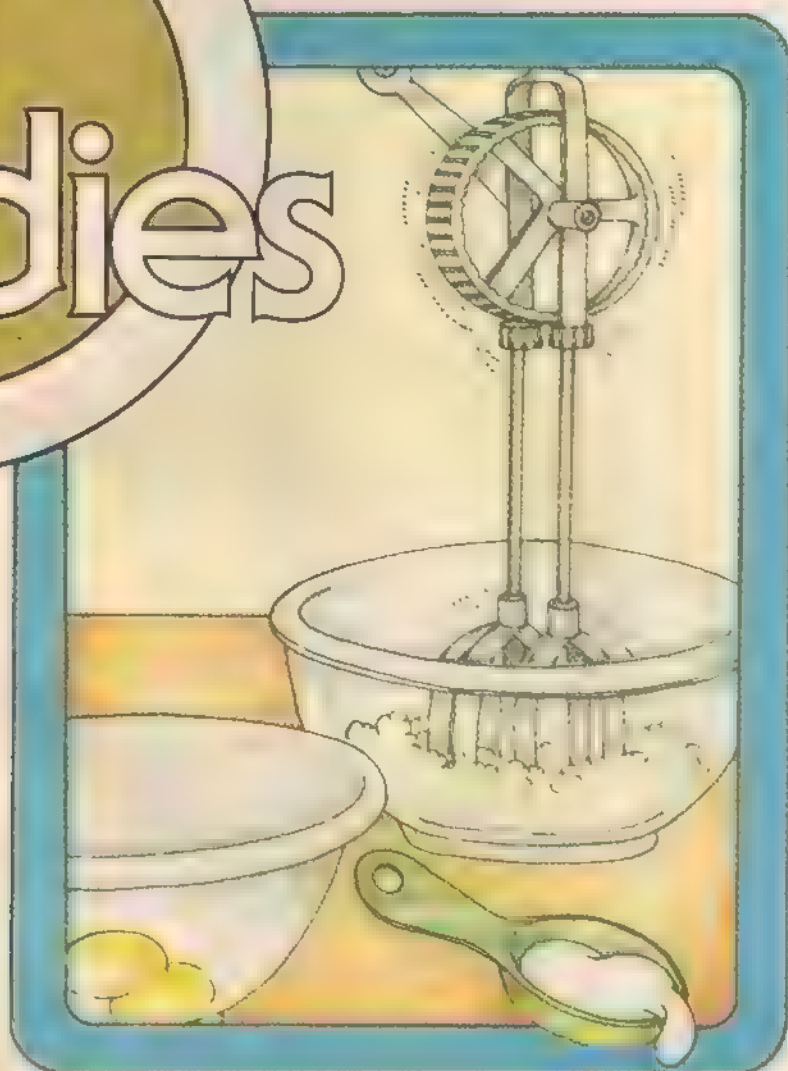
Hair Care

Most shampoos are just fine for your hair. But why not make your own? Here's a recipe for an egg rinse that will help your hair look healthy and shiny.

You Need: Two eggs, an egg beater, water and two bowls.

- 1.** Separate two eggs. That means put the yolks in one bowl and the egg whites in the other bowl.
- 2.** Beat the egg whites with your egg beater until they are nice and foamy.
- 3.** Now beat the yolks in the other bowl. Add one tablespoon of water and keep mixing until the yolks are creamy.
- 4.** Combine the egg whites and yolks in a single bowl. Now you're ready to try your egg rinse.
- 5.** Wash your hair and dry it with a towel.
- 6.** Rub some of the egg rinse into your hair. Massage for a few minutes. Now rinse thoroughly with warm water.
- 7.** Repeat step 6.
- 8.** Dry your hair. It should look shinier than ever. If you aren't completely satisfied, cheer up! You can use your leftover rinse to make French toast.

...dies



California Condor

THE FIGHT TO SAVE A RARE BIRD

by Ken Wilson

Hundreds of years ago, California Condors flew in the skies above North America. When these giant birds flapped their 10-foot wings, it sounded like a clap of thunder on a dark, stormy day. American Indians called them "thunderbirds" or "spirit birds." They worshipped them in religious ceremonies.

As cities and roads were built in the land of the condor, these powerful birds began to disappear. Today, scientists are worried. Once thousands of condors roamed North America. Now there are fewer than 30. Soon they may all be gone forever.

"If we don't do something to save the condors right now," says ornithologist (bird expert) Dr. Ralph Schreiber, "there won't be any left by the year 2000."

Scientists like Dr. Schreiber and John Borneman have been studying the condor problem for years. Their studies have shown that people are to blame for the California Condors' troubles. "People have been killing and just plain bothering the birds since we first came to condor country," says Mr. Borneman.

A Sad Story

Many of the things that hurt and killed the condors were not done on purpose. Sometimes, they would die from poisons left for other animals. Other times, ranchers would shoot them, thinking the condors were killing their cattle. They later found out

in the sky. There are fewer than 30 of these birds left in the world. Scientists hope to save the birds from dying out.





that condors don't kill other animals. They are scavengers. This means they only eat the flesh of animals that have already died.

Another reason condors began to disappear was because they lost their homes. People began clearing the forest for their roads and houses. The condors could not survive.

Today, California Condors are protected by law. All of them live near Southern California's Los Padres National Forest. But a safe place to live may not be enough to save the condors.

A pair of condors can only have one baby every two years. It takes five years to raise a young bird. The parents are very shy and easily frightened. If anything upsets them—like the sound of a nearby car or a motorcycle—they could fly away from their youngster and never come back. If left alone, a young condor will die.

California Condors aren't raising enough young. And without young, healthy birds to carry on, the condors will die out and disappear forever—become extinct.

When they spread their wings, condors measure 10 feet across. That makes the California Condor one of the world's biggest flying birds.

A Plan to Save the Condor

A group of scientists called the California Condor Recovery Team is working on a plan to save the condors. It's called *captive breeding*. That means catching young birds so they can mate and produce new birds in zoos and wildlife parks.

The captive breeding plan will work something like this:

Teams of scientists will hike into the rocky, dry places where condors live. They will carry specially-made nets. The scientists will place a dead animal on top of the hidden net and wait. If the scientists hide well, and if a condor is nearby, the bird will come to feed. When it lands on the net, the scientists will spring the trap. The bird will be captured, unharmed. The condors that are caught will be taken to zoos.

If the captured condors feel at home in the


zoo, they will mate. Their children will be the first California Condors ever born out of the wild. Scientists will call these birds the second generation.

If all goes according to plan, the second generation will raise their young, too. Their children—the third generation—will be trained and put back into the wild. By trained, scientists mean that the birds will be taught to live without the help of people. This has been tried with a few other birds. With some, like the Hawaiian goose and the Peregrine falcon, it has been successful.

The California Condor Recovery Team has gone to Congress to ask for \$8 million to begin the captive breeding program. If all goes well, they will start capturing condors this year.

Will It Work?

Not all scientists think captive breeding will work. Some say that if a bird is raised in a zoo, it will always need people to feed it. These scientists suggest a different solution. They want to leave the condors alone in the wild for two years to see if their population will grow.

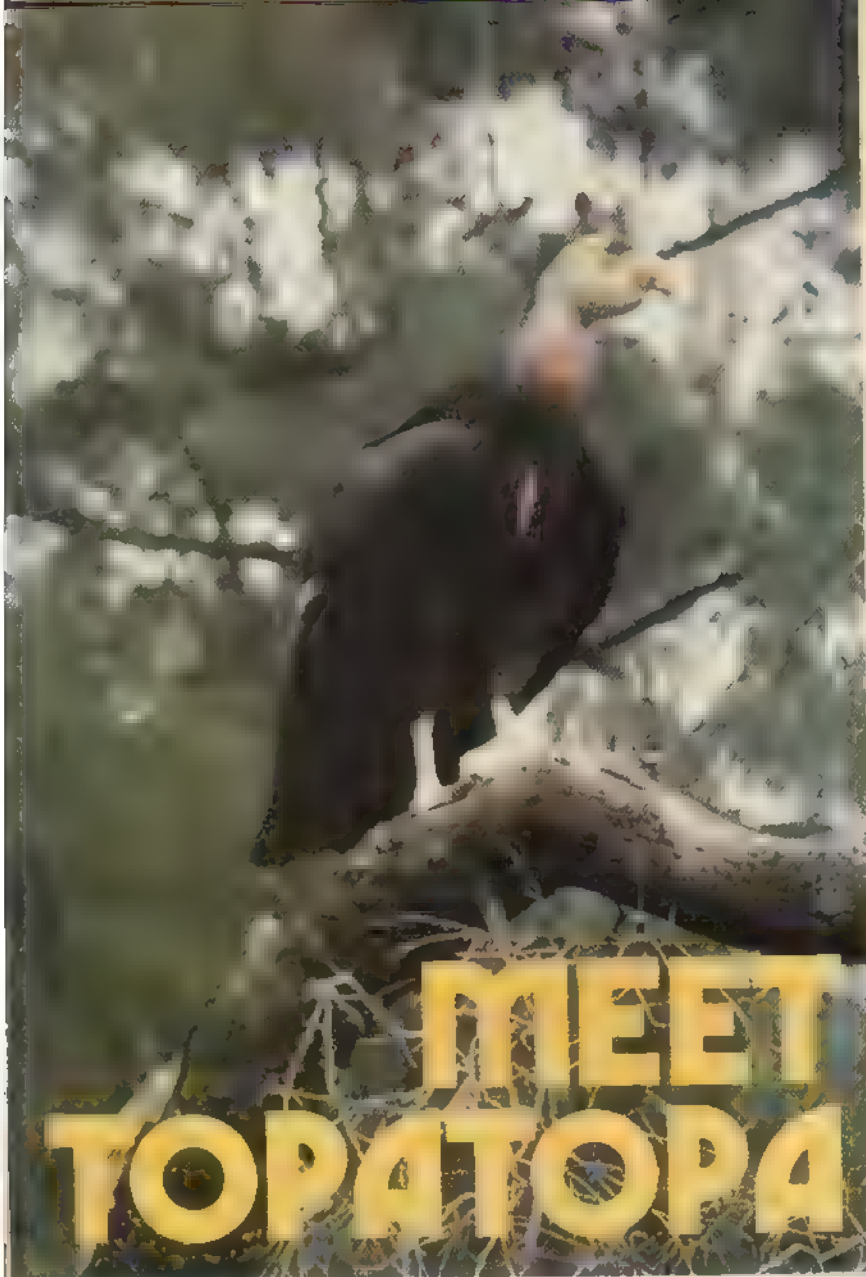
Bird expert John Borneman disagrees with them. "They are dreaming," he says. "There are fewer and fewer birds every year. The time to act to save the California Condor is now." 



Above: a baby condor. Very few California Condors have been born in the past few years.

Below: a condor flies over its home in Los Padres National Park in California. It can fly 100 miles without resting.





the zoo. He has lived there ever since.

Today, Topatopa is a full-grown, healthy bird. He has never been sick and has quite a healthy appetite. He eats dead laboratory rats and chicken parts. After eating, he carefully wipes his face on the grass. Like all condors, Topatopa is a very clean bird.

When visitors come, he flies to the edge of his cage to greet them. He shows off by puffing his head and neck. He also makes his head change color—from dull orange to blotches of bright pink, purple and yellow. This may be a condor's way of blushing. Or maybe he's just showing off.

Scientists have learned a lot about condors by watching Topatopa. And the more they know about this fascinating bird, the better their chances of saving the California Condor will be.

—by Ken Wilson

Topatopa is the only California Condor living in a zoo. In this photo, 10-year-old Topatopa relaxes on a branch in his \$65,000 cage at the Los Angeles Zoo. Below, he shows off for visitors by puffing out his cheeks and neck.

Topatopa is a celebrity. He's the only California Condor living in a zoo.

The 12-year-old bird makes his home at the Los Angeles Zoo in a \$65,000 cage built just for him. The giant-sized cage is full of the same rocks, trees and grasses found in wild condor country. The only real difference is the nylon net that keeps Topatopa from flying away.

Topatopa has been living at the zoo since 1967. When scientists found him in the Topatopa Mountains near Los Angeles, he was very young and very weak. His parents had deserted him. He was taken to the zoo. There he was fed and strengthened.

After 10 days of care, the scientists tried to release Topatopa where they found him. But the other condors would have nothing to do with him. Some even attacked him. The scientists were afraid he would die, so they brought him back to



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Answers

Word Hunt (page 23)



Comet Maze (page 29)



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Thanks to the teachers and children from the following schools for their help: The Emerson School and Public School #75 in New York City, and St. Bartholomew's School in Bethesda, Maryland. Also, thanks to Stuyvesant and Clinton YMCA Camps in New York and the Hardy Recreation Center in Washington, D.C.

Portions of last month's volcano story were adapted from the book *Volcanoes* by Peter Francis, published by Viking Press.

Next Month!

Here's a sample of what you will find next month in 3-2-1 CONTACT:

The Black Hole

An exciting look at the new science fiction thriller.

How It Works

A brand new feature.
Take a look inside your TV set.

Twins

Meet two nine-year-olds who have invented their own language.

Plus: Games, puzzles, experiments and a few surprises.

Skyfacts: Mercury

Each month SKYWATCH will bring you a close-up look at another planet or moon. Clip these pages and save them in a notebook. At the end of the year, you will have your own guide to the solar system.

Skywatch



Symbol: The sign at the left stands for the wand that the god named Mercury carried.



Size: Mercury measures 9,520 miles (15,318 km.) around its equator. That's only one third the size of Earth's equator.



Day: It takes 59 Earth days to make one day on Mercury.

Year: It takes 88 Earth days for Mercury to go around the sun. That's how long its year is.



Temperature: It ranges from minus 270° to plus 660°F (-168° to 349°C). Its hottest temperature is much hotter than boiling water. It's hot enough to melt lead.

Early theories: Mercury has a strange orbit. It shifts a few miles every 100 years. In 1874, an astronomer thought this might be caused by the gravity of an unknown planet, hidden on the other side of the sun. He named it Vulcan. Astronomers searched for this imagined planet until 1907, when Albert Einstein's theory of relativity explained Mercury's strange orbit.

Atmosphere: Like our moon, Mercury has almost no atmosphere. That's why it gets so cold at night. There isn't enough air to hold the heat.



Surface: Most of Mercury is covered with craters. Some are 800 miles (1,287 km.) wide. There are mountains, but the biggest are smaller than those on Earth.



Moons: Mercury has no moons.

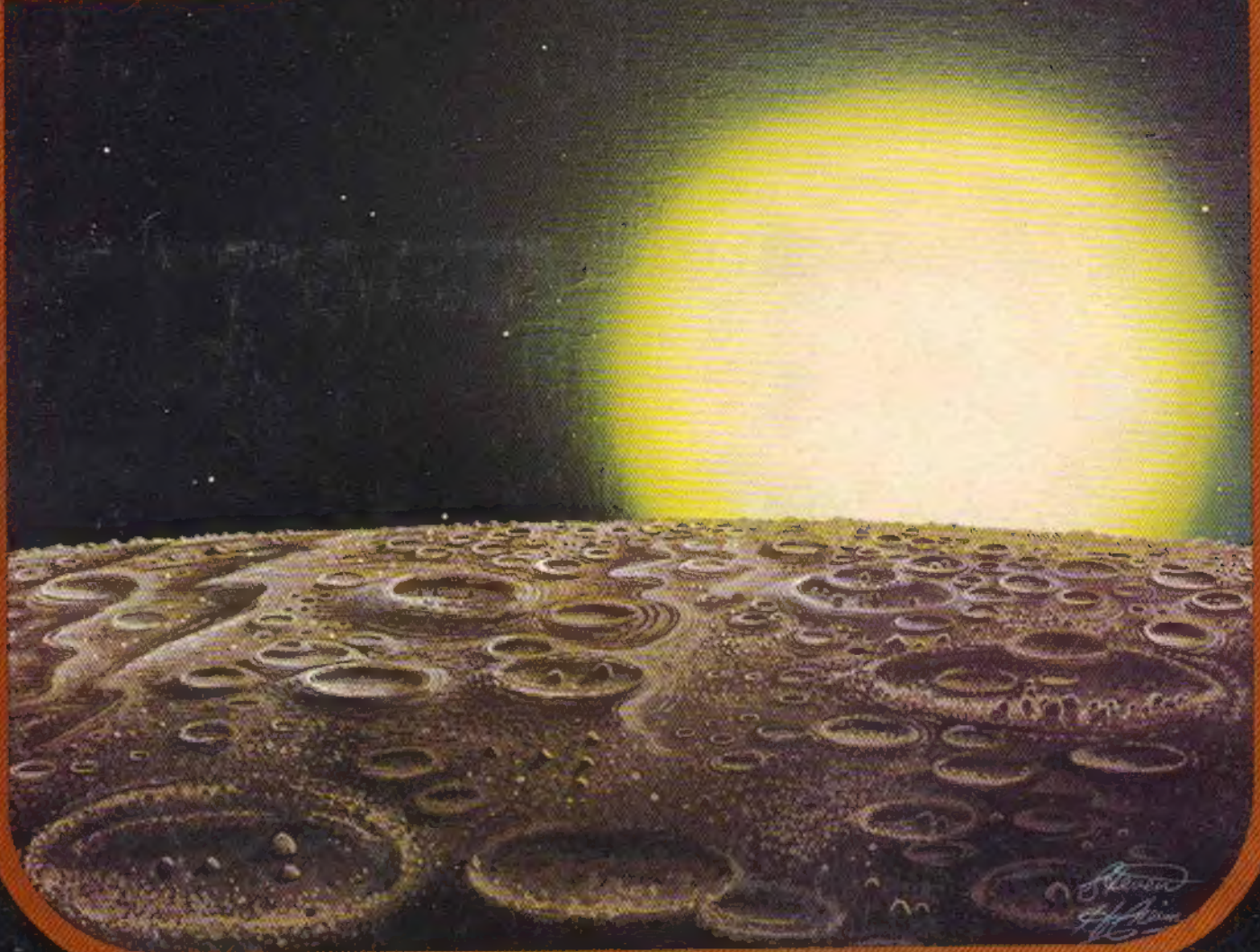


You on Mercury: To find out your weight on Mercury, multiply your Earth weight times two. Now divide that amount by five.



Modern theories: Scientists got their first close look at Mercury about six years ago. The U.S. Mariner 10 flew within 500 miles of Mercury and sent information back to Earth. Scientists now think the planet has a large core of iron. Mariner 10 also found small amounts of helium gas, in what little there is of Mercury's atmosphere.

Skywatch



Above: An artist's picture of the sunrise on Mercury.

Focus on Mercury, the Planet Closest to the Sun.

Over 2,000 years ago, people saw a star. Each night it changed position in the sky. Because it moved so quickly, they named it Mercury, after the speedy messenger of the gods.

We now know that Mercury is a planet. It is the closest one to the sun.



Skysight:

Because it is so close to the bright sun, Mercury is hard to see. In December you can look for it about two hours before sunrise. Look in the southeast part of the sky. (turn the page)